United States
Department of
Agriculture

Natural
Resources
Conservation
Service

In cooperation with
North Carolina
Department of
Environment, Health, and
Natural Resources;
North Carolina
Agricultural Research
Service; North Carolina
Cooperative Extension
Service; Union Soil and
Water Conservation
District; and Union
County Board of
Commissioners

Soil Survey of Union County, North Carolina

How To Use This Soil Survey

General Soil Map

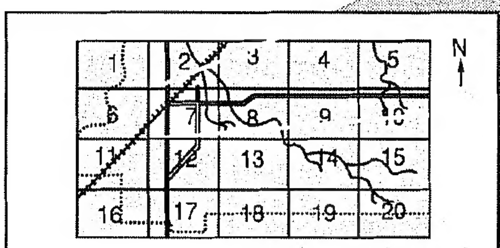
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

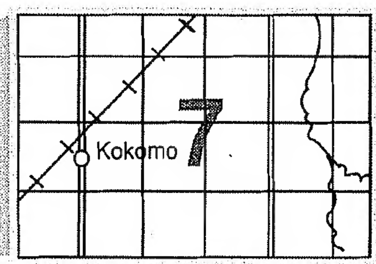
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.

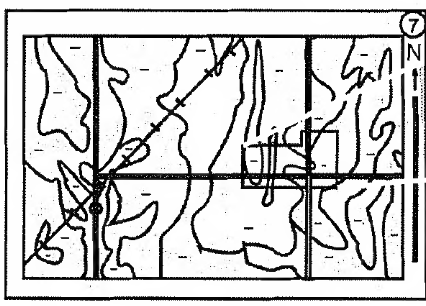


INDEX TO MAP SHEETS

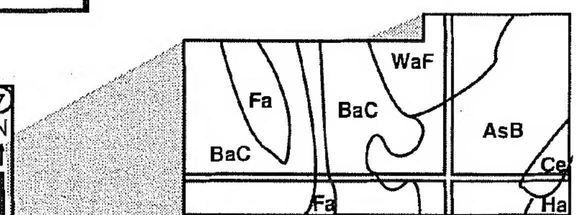


MAP SHEET

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



MAP SHEET



AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the North Carolina Agricultural Research Service, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1990. Soil names and descriptions were approved in 1991. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1991. This soil survey was made cooperatively by the United States Department of Agriculture, Natural Resources Conservation Service; the North Carolina Department of Environment, Health, and Natural Resources; the North Carolina Agricultural Research Service; the North Carolina Cooperative Extension Service; the Union Soil and Water Conservation District; and the Union County Board of Commissioners. It is part of the technical assistance furnished to the Union Soil and Water Conservation District. The Union County Board of Commissioners provided financial assistance for the survey, and the Union Soil and Water Conservation District provided clerical assistance.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

The first soil survey of Union County was published by the U.S. Department of Agriculture in 1914. This survey updates the first survey, provides more detailed maps on aerial photographs, and contains more interpretive information *(6)*.

All programs and services of the Natural Resources Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: Soybeans planted in wheat stubble in an area of Badin channery silt loam, 2 to 8 percent slopes.

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Issued January 1996

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Summary of Tables

Foreword

This soil survey contains information that can be used in land-planning programs in Union County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow over bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the North Carolina Cooperative Extension Service.

Richard A. Gallo
State Conservationist
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Soil Survey of Union County, North Carolina

By Ronald B. Stephens, Natural Resources Conservation Service

Soils Surveyed by Ronald B. Stephens, M. Kent Clary, and Daniel G. Spangler, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
North Carolina Department of Environment, Health, and Natural Resources;
North Carolina Agricultural Research Service; North Carolina Cooperative Extension Service; Union Soil and Water Conservation District; and Union County Board of Commissioners

Union County is in the south-central part of North Carolina (fig. 1). It is bordered by Mecklenburg, Cabarrus, Stanly, and Anson Counties in North Carolina and by Chesterfield and Lancaster Counties in South Carolina. It is a major agricultural county and has significant industrial development. In 1980, the population of Union County was 70,380 and the population of Monroe, the county seat, was 12,639 *(12)*.

The total area of the county is 409,139 acres, or about 639 square miles. Elevation ranges from about 275 feet above sea level along the Rocky River in the northeastern part of the county to about 770 feet above sea level in an area two miles southwest of Waxhaw in the southwestern part of the county.

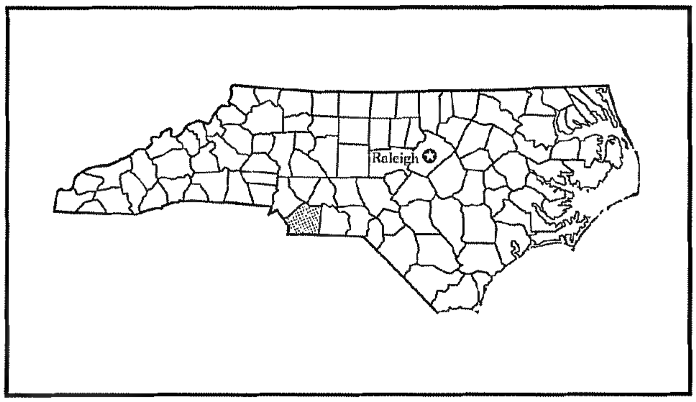


Figure 1.—Location of Union County in North Carolina.

General Nature of the County

This section gives general information concerning the county. It describes history and development; physiography, relief, and drainage; water supply; and climate.

History and Development

The area that is now Union County was originally inhabited by Indians of the Waxhaw tribe. In 1741, an epidemic of smallpox almost annihilated the tribe and the survivors left the area to join other tribes. In about 1750, settlers began arriving from Pennsylvania and from Germany, England, Wales, and Scotland. The land was well suited to farming, and new communities grew and prospered.

The area was divided between Mecklenburg and Anson Counties until the establishment of Union County on December 19, 1842. The name of the county was chosen as a compromise between the Whigs, who had favored "Clay," and the Democrats, who had favored "Jackson." "Union" was chosen because the county was a union of parts of two other counties. In 1843, the

first County Board of Commissioners founded the county seat at Monroe, which was named in honor of the fifth President of the United States, James Monroe.

The settlers developed a self-sufficient agricultural economy that eventually evolved into a specialized crop economy that was dependent upon cotton. Cotton was the primary money crop in the county until a diversification campaign was begun in 1920 as a hedge against a sagging cotton market and to preserve the topsoil in the area. By 1975, the county was the top producer of turkeys and eggs in North Carolina. Other products included soybeans, corn, milo, swine, broilers, and dairy goods *(14)*.

Currently, over 1,200 businesses are in the county. Among the major industries are the production of processed foods, plastic pipe, plastic fittings, crushed stone and clay products, furniture, and textiles.

Educational facilities in the county include 26 elementary, middle, and high schools in the Monroe City and Union County systems; 2 private schools; and Wingate College, which is a private, coeducational institution having over 1,500 students enrolled in baccalaureate and associate degree programs.

Transportation facilities include several major highways, eight trucklines, a bus line, and a railroad. The major highways are U.S. Highways 74 and 601 and North Carolina Highways 200, 205, 84, 75, 218, 207, and 16. The City of Monroe owns and maintains an airport that has a 5,000-foot runway *(5)*.

Physiography, Relief, and Drainage

Union County is in the Southern Piedmont physiographic region. It is generally characterized as gently sloping with steeper areas along drainageways.

The Catawba and PeeDee River basins drain all of the land in the county. The western and southwestern parts of the county are in the Catawba basin. Streams in this basin generally flow northeast to southwest. The rest of the county is in the PeeDee basin. Tributaries in this basin flow southwest to northeast. Most of the streams in this basin flow into the Rocky River, which is a major tributary of the PeeDee River. The Rocky River forms most of the northern boundary of the county.

Water Supply

Three reservoirs comprise the primary water supply for the City of Monroe and the other cities in the central and western parts of Union County. These reservoirs are Lake Lee, which is 56 acres; Lake Monroe, which is 140 acres; and Lake Twitty, which is 400 acres. Ground-water wells supply the rest of the county. Drilled wells are used by most rural residents. They usually range from 90 to 270 feet in depth and from 6 to 8 inches in diameter. They have an average yield of 10 to 20 gallons per minute. Few wells are reported running dry.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Monroe, North Carolina, in the period 1951 to 1981. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 43 degrees F and the average daily minimum temperature is 32 degrees. The lowest temperature on record, which occurred at Monroe on December 12, 1958, is -1 degrees. In summer, the average temperature is 77 degrees and the average daily maximum temperature is 88 degrees. The highest recorded temperature, which occurred at Monroe on July 21, 1952, is 106 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 47 inches. Of this, 25 inches, or 53 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 21 inches. The heaviest 1-day rainfall during the period of record was 6.2 inches at Monroe on October 26, 1977. Thunderstorms occur on about 42 days each year.

The average seasonal snowfall is about 5 inches. The greatest snow depth at any one time during the period of record was 11 inches. On an average of 2 days, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 55 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 70 percent of the time possible in summer and 60 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 9 miles per hour, in spring.

Severe local storms, including tornadoes, occasionally strike in or near the area. They are short of duration. Damage from these storms varies and is spotty. Every few years in summer or autumn, a tropical depression or a remnant of a hurricane that has moved inland causes extremely heavy rains for 1 to 3 days.

How This Survey Was Made

This survey was made to provide information about the soils in Union County. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They studied many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the unconsolidated material from which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Soils occur in an orderly pattern that results from the combined influence over time of climate, parent material, relief, and plants and animals. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils and relating their position to specific segments of the landscape, soil scientists a develop concept, or model, of how the soils were formed. This model enables the soil scientists to predict with a considerable degree of accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify the soils. After describing the soils and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area are generally collected for laboratory analyses and for engineering tests. The data from these analyses and tests and from field-observed characteristics and soil properties are used to predict behavior of the soils under different uses. Interpretations are field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a relatively high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will be at a specific level in the soil on a specific date.

Soil boundaries are drawn on aerial photographs and each delineation is identified as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in accurately locating boundaries.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by two or three kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soils for which it is named and some soils that belong to other taxonomic classes. In the detailed soil map units, these latter soils are called inclusions or included soils.

In the general soil map units, they are called minor soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are identified in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where soil patterns were so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or a building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

1. Iredell-Gaston-Mecklenburg

Nearly level to strongly sloping, well drained to somewhat poorly drained soils that have a loamy surface layer and a dominantly clayey subsoil; formed in material weathered from dominantly mafic crystalline rocks having a high content of ferromagnesian minerals; on uplands

This map unit is in the western part of the county. It makes up about 1 percent of the county. It is about 38 percent Iredell soils, 33 percent Gaston soils, 18 percent Mecklenburg soils, and 11 percent soils of minor extent.

Iredell soils are moderately well drained and somewhat poorly drained. They are dominantly on broad flats. The very broad areas are broken by knolls, which have a slightly higher elevation and are as much as 20 acres in size. The surface layer is loam. The subsoil is very firm, plastic clay and clay loam.

Gaston soils are well drained. They are on ridges and side slopes. The surface layer is clay loam. The subsoil is dark red clay in the upper part and red clay and clay loam in the lower part.

Mecklenburg soils are well drained. They are on ridges and large knolls in the less sloping areas. The surface layer is sandy clay loam. The subsoil is plastic clay in the upper part and clay loam in the lower part.

The minor soils include Zion soils on the more dissected parts of the landscape and Chewacla soils on flood plains.

This unit is used mainly as cropland or pasture. Some areas are wooded. The hazard of erosion, wetness, slow permeability, a moderate to very high shrink-swell potential, and the slope are the main management concerns.

2. Cecil-Appling

Gently sloping to strongly sloping, well drained soils that have a loamy surface layer and a dominantly clayey subsoil; formed in material weathered from felsic crystalline rocks; on uplands

This map unit is in the western part of the county. It makes up about 8 percent of the county. It is about 54 percent Cecil soils, 11 percent Appling soils, and 35 percent soils of minor extent (fig. 2).

Cecil soils are on ridges and side slopes. The surface layer is gravelly sandy clay loam. The subsoil is clay in the upper part and clay loam in the lower part.

Appling soils are on broad ridges and narrow side slopes. The surface layer is sandy loam. The subsoil is sandy clay loam in the upper part, clay in the next part, and sandy clay loam in the lower part.

The minor soils include Ailey, Gaston, Helena, Zion, Pacolet, Georgeville, Tatum, Colfax, and Chewacla soils. The well drained Ailey soils are near Appling soils in an area southwest of Waxhaw. The well drained Gaston soils are intermingled with areas of the Cecil soils. The moderately well drained Helena soils are on toe slopes and in depressions. The well drained Zion soils are in scattered areas throughout the unit. The well drained Pacolet soils are along side slopes. The well drained Georgeville and Tatum soils are in areas that adjoin the slate belt. The somewhat poorly drained Colfax soils are in depressions. The somewhat poorly drained Chewacla soils are along flood plains.

This unit is predominantly used as woodland. The rest is used for crops, pasture, or urban development. The main management concerns in areas of cropland and pasture are the slope and the hazard of erosion.

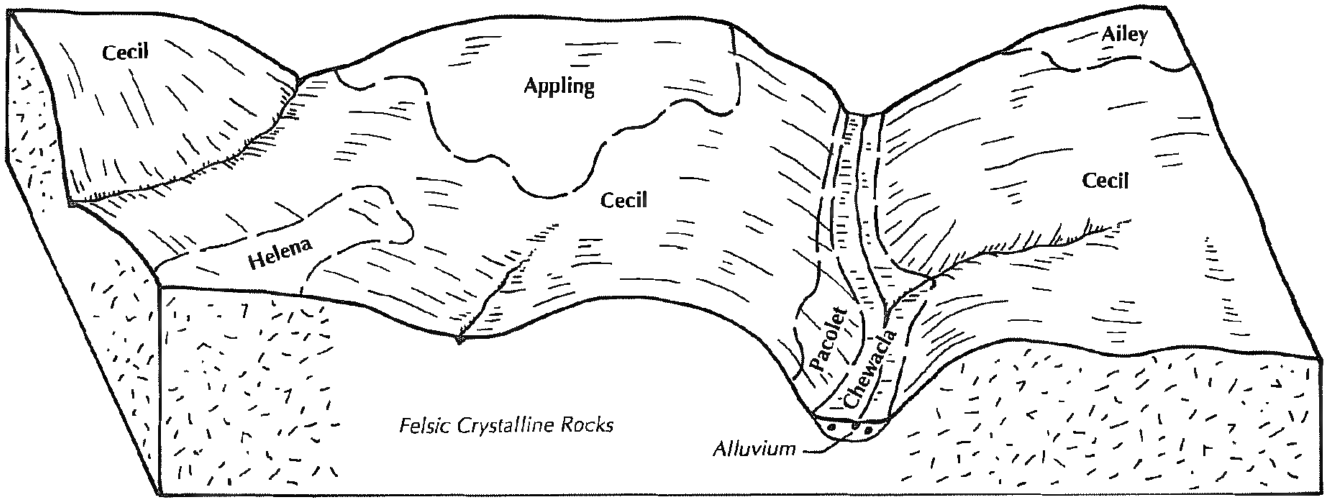


Figure 2.—Pattern of soils and parent material in the Cecil-Appling general soil map unit.

The content of clay in the subsoil and the slope are limitations affecting building site development.

3. Tatum

Gently sloping to steep, well drained soils that have a loamy surface layer and a dominantly clayey subsoil; formed in material weathered from Carolina Slates; on uplands

This map unit is dominantly in the western part of the county. It also is in small widely scattered areas. It makes up about 18 percent of the county. It is about 65 percent Tatum soils and 35 percent soils of minor extent (fig. 3).

Tatum soils are on broad ridges and narrow side slopes. The surface layer is gravelly silt loam or gravelly silty clay loam. The subsoil is silty clay in the upper part and silty clay loam in the lower part.

The minor soils include Georgeville, Badin, Goldston, Cecil, Cid, Secrest, Chewacla, and Zion soils. The well drained Georgeville soils are on broad, smooth ridges. The well drained Badin soils are on the narrower and more undulating ridges. The excessively drained Goldston soils are in areas of the steeper, more rolling topography. The well drained Cecil soils are in areas adjoining the Cecil-Appling general soil map unit. The moderately well drained and somewhat poorly drained Cid soils and the moderately well drained Secrest soils are on broad ridges, in depressions, and along drainageways. The somewhat poorly drained Chewacla soils are along flood plains. The well drained Zion soils are in scattered areas throughout the unit.

This unit is used mainly as cropland or pasture, especially on the gently sloping ridgetops. The steeper areas are used mostly as woodland. The hazard of erosion and the slope are the main management concerns in areas of cropland and pasture. The main limitations affecting urban development are the content of clay, the depth to bedrock, and the slope.

4. Cid-Badin-Goldston

Nearly level to steep, excessively drained to somewhat poorly drained soils that have a loamy surface layer and a loamy or clayey subsoil; formed in material weathered from Carolina Slates; on uplands

This map unit is in scattered areas throughout the county. Individual mapped areas are elongated. The landscape is characterized by broad areas that are broken by many large knolls and rolling areas. The unit makes up about 15 percent of the county. It is about 45 percent Cid soils, 24 percent Badin soils, 16 percent Goldston soils, and 15 percent soils of minor extent (fig. 4).

Cid soils are nearly level and gently sloping and are moderately well drained and somewhat poorly drained. They are on broad ridges and along drainageways. The surface layer is channery silt loam. The subsoil is channery silty clay loam in the upper part, silty clay in the next part, and channery silty clay in the lower part.

The well drained Badin soils are on knolls in flat areas, on ridges, and on long, narrow side slopes adjacent to drainageways. The surface layer is

channery silt loam or channery silty clay loam. The subsoil is dominantly silty clay.

The excessively drained Goldston soils are predominantly near the Badin soils in the steeper, broken areas. The surface layer and subsoil are very channery silt loam.

The minor soils include the well drained Tatum soils on broad, smooth ridges; the moderately well drained, nearly level Secrest soils on broad flats and at the head of drainageways; the moderately well drained and somewhat poorly drained Misenheimer soils in depressions in the more undulating areas; and the somewhat poorly drained Chewacla soils along flood plains.

This unit is used mainly as cropland, pasture, or woodland. The hazard of erosion, wetness, and the depth to bedrock are the main limitations affecting farming. This unit is generally not used for urban development because of the wetness and the depth to bedrock.

5. Badin-Cid-Goldston-Tatum

Nearly level to steep, excessively drained to somewhat poorly drained soils that have a loamy surface layer and a loamy or clayey subsoil; formed in material weathered from Carolina Slates; on uplands

This map unit is throughout the central and north-central parts of the county. The landscape includes wide ridges that have upland depressions and narrow ridges and convex side slopes along the major streams. The unit makes up about 45 percent of the county. It is about 42 percent Badin soils, 17 percent Cid soils, 16 percent Goldston soils, 15 percent Tatum soils, and 10 percent soils of minor extent.

Badin soils are well drained. They are mainly on narrow, undulating ridges and side slopes. The surface layer is channery silt loam or silty clay loam. The subsoil is dominantly silty clay.

Cid soils are moderately well drained and somewhat poorly drained. They are on broad flats and narrow

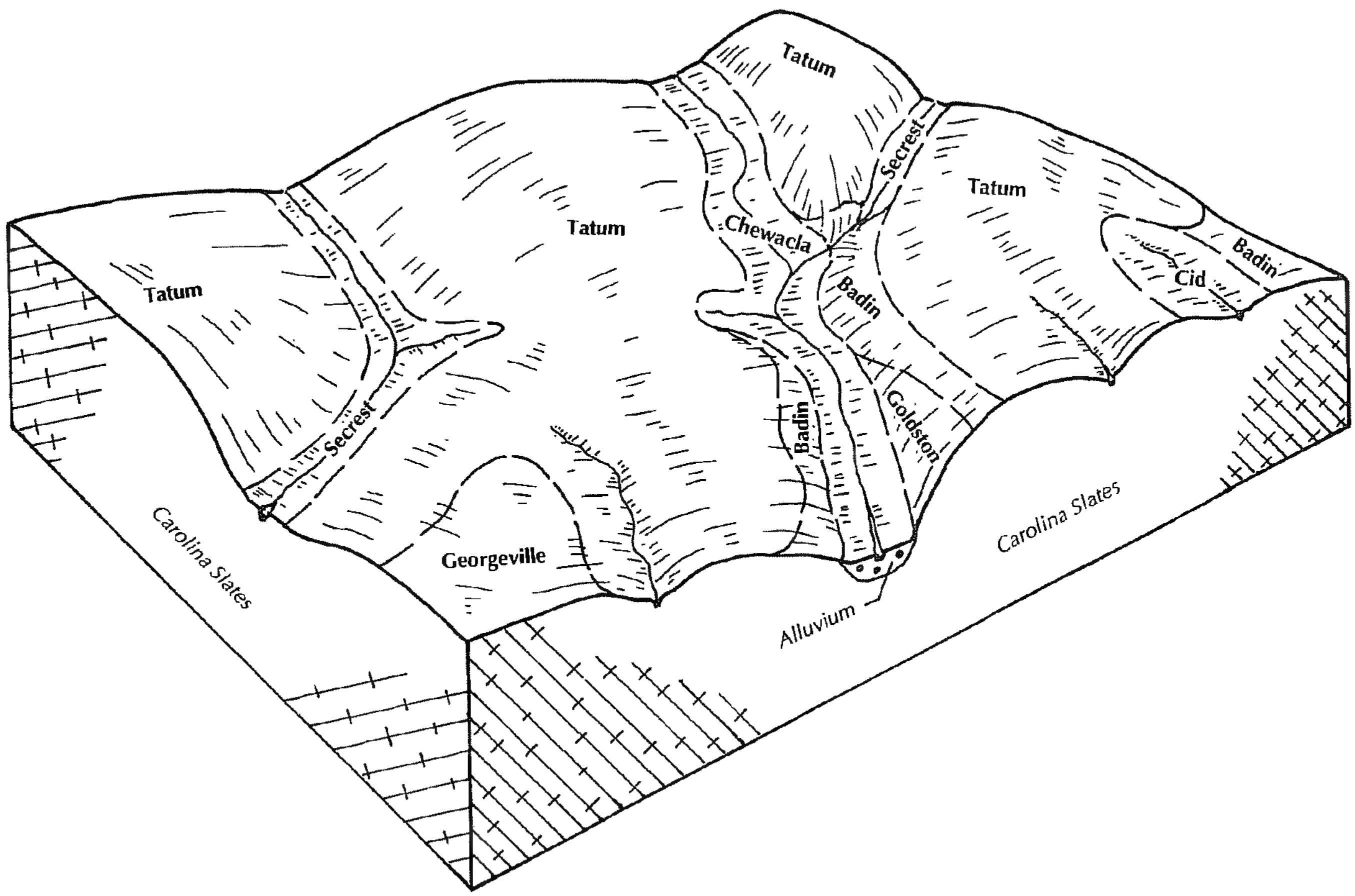


Figure 3.—Pattern of soils and parent material in the Tatum general soil map unit.

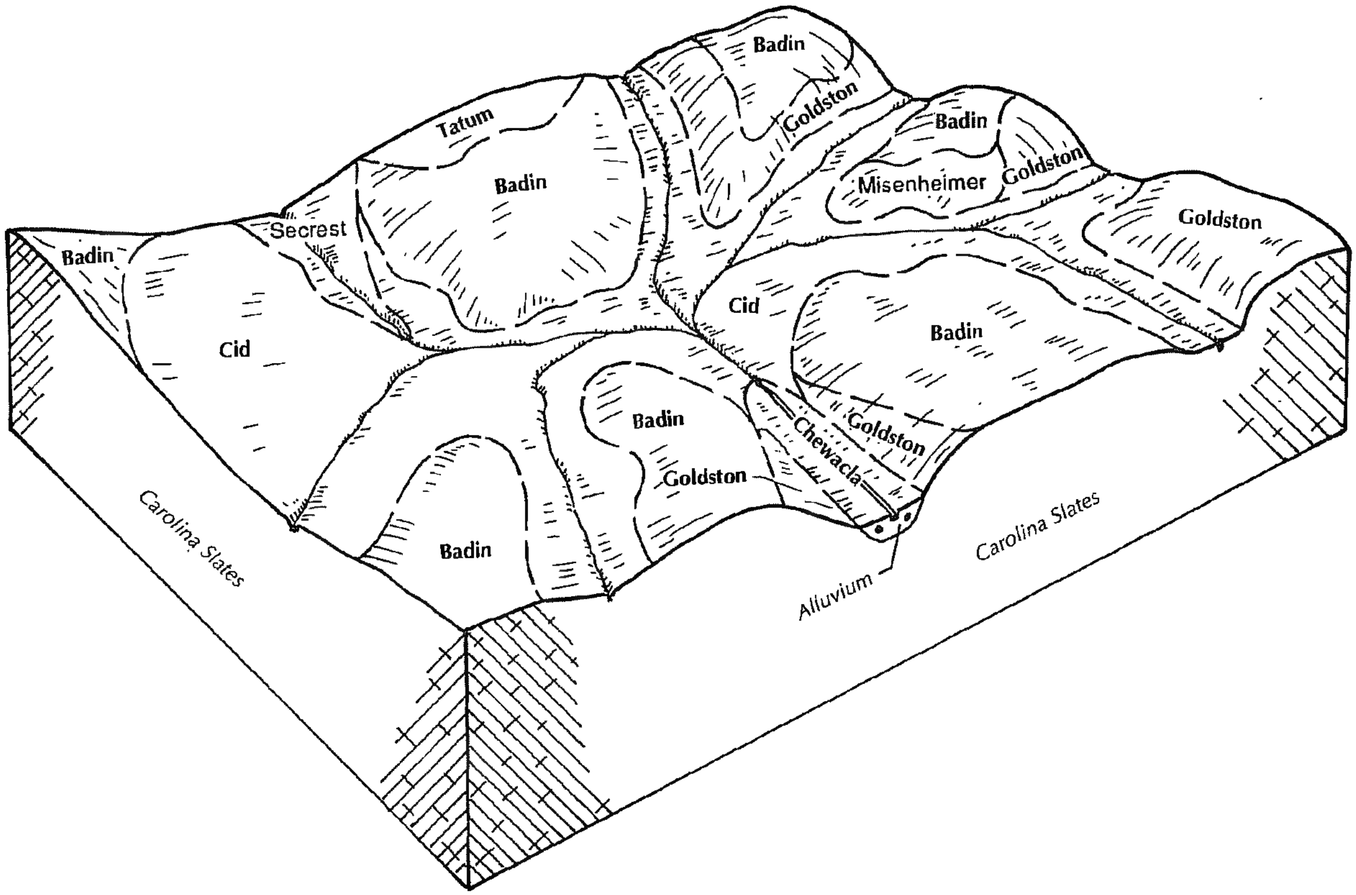


Figure 4.—Pattern of soils and parent material in the Cid-Badin-Goldston general soil map unit.

ridges and along drainageways. The surface layer is channery silt loam. The subsoil is dominantly channery silty clay.

Goldston soils are shallow and excessively drained. They are in the more rolling dissected areas of the unit, commonly near Badin soils. The surface layer and subsoil are very channery silt loam.

Tatum soils are on broad ridges and on side slopes. The surface layer is gravelly silt loam or gravelly silty clay loam. The subsoil is dominantly silty clay.

The minor soils include Georgeville soils on broad ridges at the higher elevations; Secrest soils in upland depressions, at the head of drainageways, and along drainageways; Misenheimer soils on flats adjacent to the Goldston soils; Zion soils in scattered areas on the higher ridges; and the somewhat poorly drained Chewacla soils on flood plains.

About two-thirds of the acreage of this unit is used as cropland. The rest is used for urban development or as woodland, hayland, or pasture. The cropland is mainly on the broad ridgetops. Most of the woodland is on the steeper side slopes. The hayland and pasture are intermingled in the more strongly sloping areas. The main management concerns are the slope, surface runoff, wetness, and the hazard of erosion. Moderate permeability, the clayey texture, and low strength are additional limitations affecting urban uses.

6. Goldston-Badin-Cid

Nearly level to steep, excessively drained to somewhat poorly drained soils that have a loamy surface layer and a loamy or clayey subsoil; formed in material weathered from Carolina Slates; on uplands

This map unit is dominantly in the eastern part of the county. It makes up about 12 percent of the county. It is about 47 percent Goldston soils, 23 percent Badin soils, 15 percent Cid soils, and 15 percent soils of minor extent (fig. 5).

Goldston soils are on narrow, convex ridges and side

slopes that are broken by many drainageways. They are excessively drained. The surface layer is very channery silt loam. The subsoil is very channery silt loam.

Badin soils are on the broader ridges and the smoother side slopes. They are well drained. The surface layer is channery silt loam or channery silty clay loam. The subsoil is channery silty clay loam in the upper part, silty clay in the next part, and channery silty clay loam in the lower part.

Cid soils are on low ridges, along drainageways, and in depressions. They are moderately well drained and somewhat poorly drained. The surface layer is channery silt loam. The subsoil is dominantly channery silty clay.

The minor soils include the well drained Tatum soils on the broader ridges, the moderately well drained and somewhat poorly drained Misenheimer soils in depressions and drainageways in the more rolling areas, and the somewhat poorly drained Chewacla soils on flood plains adjacent to streams.

This unit is used mainly as pasture or woodland. Some gently sloping areas are used as cropland. The hazard of erosion, the slope, wetness, and the depth to bedrock are the main management concerns in areas of pasture, woodland, and cropland. The main limitations affecting urban development are the slope, the depth to bedrock, and the wetness.

7. White Store-Creedmoor-Chewacla

Nearly level to strongly sloping, moderately well drained and somewhat poorly drained soils that have a loamy surface layer and a loamy or clayey subsoil; formed in material weathered from Triassic rocks and in recent alluvium; on uplands and flood plains

This map unit is in a valley along Brown Creek in the southeastern part of the county. It makes up about 1 percent of the county. It is about 39 percent White Store soils, 32 percent Creedmoor soils, 27 percent Chewacla soils, and 2 percent soils of minor extent.

White Store soils are mainly on ridges and side slopes. The surface layer is loam. The subsoil is very firm, plastic clay and silty clay.

Creedmoor soils are on broad ridges. The surface layer is loam. The subsoil is sandy clay loam in the upper part; very firm, plastic clay in the next part; and clay loam in the lower part.

Chewacla soils are on flood plains. The surface layer is silt loam. The subsoil is silt loam, loam, and silty clay loam.

The minor soils include Badin soils along areas adjoining soils that formed in material weathered from slate.

About two-thirds of the acreage of this unit is used as woodland. The rest is used about equally as cropland

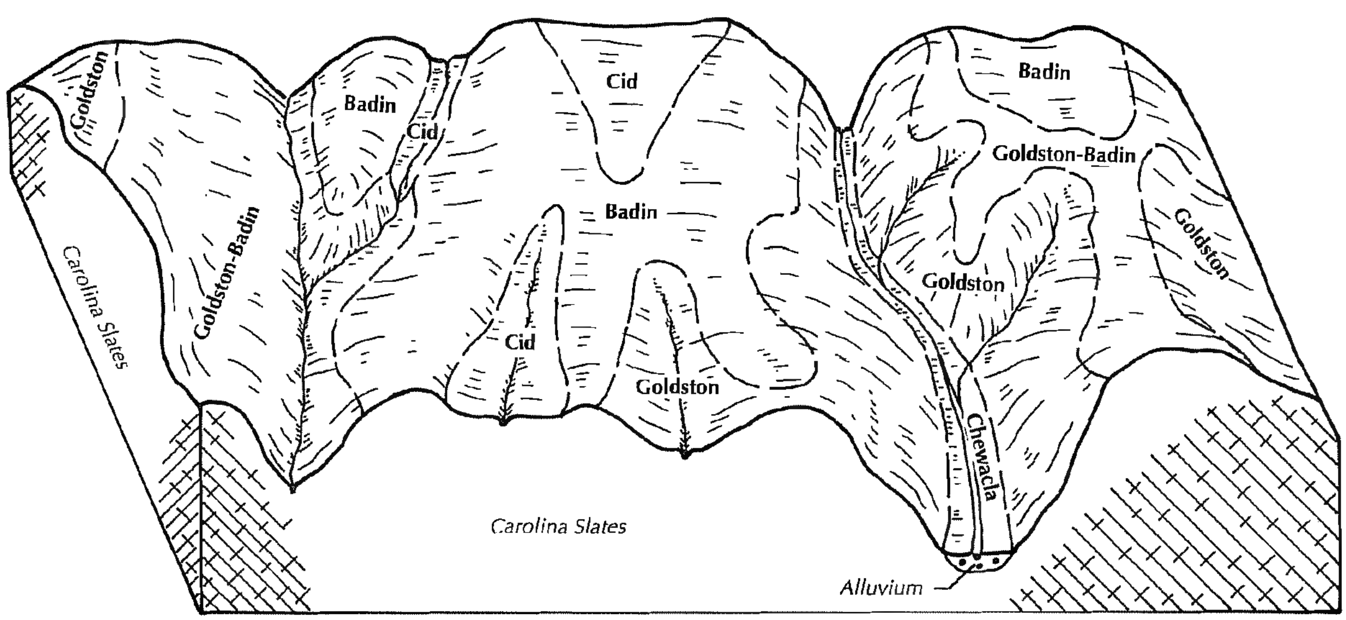


Figure 5.—Pattern of soils and parent material in the Goldston-Badin-Cid general soil map unit.

and hayland or pasture. Most of the woodland is on the steeper side slopes and on flood plains. The main management concerns are the slope, surface runoff, the hazard of erosion, and flooding. Slow permeability, the clayey texture, and low strength are additional limitations affecting urban uses.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of the dominant soils within the map unit for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit is given under the heading "Use and Management of the Soils."

The map units on the detailed soil maps represent areas on the landscape and consist mainly of the dominant soils for which the units are named.

Symbols identifying the soil precede the map unit names in the map unit descriptions. The descriptions include general facts about the soils and give the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Tatum gravelly silt loam, 2 to 8 percent slopes, is a phase of the Tatum series.

Some map units are made up of two or more major soils. These map units are called soil complexes. A *soil complex* consists of two or more contrasting soils, or miscellaneous areas, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Goldston-Badin complex, 2 to 8 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Urban land is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps. Pits, quarry, is an example.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and suitabilities for many uses. The Glossary defines many of the terms used in describing the soils.

AeB—Ailey-Appling complex, 2 to 8 percent slopes. This map unit consists mainly of very deep, well drained, gently sloping Ailey and Appling soils on smooth uplands. It is about 60 percent Ailey soil and 25 percent Appling soil. The two soils occur as areas so intricately mixed that mapping them separately is not practical at the selected scale. The map unit is in a single irregularly shaped area in the southwestern part of the county. This area is more than 1,700 acres in size.

The Ailey soil is very deep over bedrock. It is well drained. Typically, the surface layer is brown loamy sand 7 inches thick. The subsurface layer is light yellowish brown loamy sand 18 inches thick. The subsoil is 33 inches thick. In the upper part, it is yellowish brown sandy loam. In the next part, it is yellowish brown sandy clay loam. In the lower part, it is mottled yellowish brown, very pale brown, and red sandy clay loam. The underlying material to a depth of 76 inches is mottled brownish yellow, red, and light gray coarse sandy loam. In some small areas, the surface layer is thinner. In other small areas, the subsoil is clayey. In places the subsoil is loamy sand.

Permeability is moderate in the upper part of the

subsoil of the Ailey soil and slow in the lower part of the subsoil and in the underlying material. Available water capacity is low. Reaction is strongly acid or very strongly acid in the subsoil and underlying material. It varies widely in the surface layer and subsurface layer as a result of local liming practices. The shrink-swell potential is low. The hazard of erosion is moderate in bare or unprotected areas. The depth to bedrock is 6 feet or more.

The Appling soil is very deep over bedrock. It is well drained. Typically, the surface layer is brown loamy sand 6 inches thick. The subsurface layer is light yellowish brown sandy loam 8 inches thick. The subsoil is 38 inches thick. In the upper part, it is yellowish red clay loam. In the next part, it is yellowish red clay. In the lower part, it is mottled red and yellow sandy clay loam. The underlying material to a depth of 60 inches is multicolored sandy loam that weathered from saprolite. In eroded areas where the upper part of the subsoil has been mixed with the surface soil by plowing, the surface layer is sandy clay loam. In some small areas, the surface layer is gravelly sandy loam. In other small areas, it is as much as 26 inches thick.

Permeability is moderate in the Appling soil. Available water capacity also is moderate. Reaction is very strongly acid or strongly acid in the subsoil and underlying material. It varies widely in the surface layer and subsurface layer as a result of local liming practices. The shrink-swell potential is low. The hazard of erosion is moderate in bare or unprotected areas. The depth to bedrock is more than 72 inches.

Included in this unit in mapping are small areas of soils that have bedrock within a depth of 40 inches and a few small areas that have stones and boulders on the surface. Contrasting inclusions make up about 15 percent of this map unit.

This map unit is used mainly as woodland or pasture. Some areas are used as cropland.

This map unit is moderately suited to cultivated crops. The major crops are corn, soybeans, and small grain. Droughtiness, the leaching of plant nutrients, and soil blowing are the main limitations affecting crop production. The low amount of available water reduces yields. Irrigation is needed during most years. Because of the sandy texture of the surface layer, the leaching of nitrates and sulfates can be a problem. Nitrogen fertilizer should be added in split applications. Conservation tillage, crop residue management, winter cover crops, and crop rotations that include grasses and legumes increase the available water capacity and improve soil fertility.

This map unit is moderately suited to pasture and hay. A low amount of available water in the sandy surface layer reduces yields. Irrigation increases yields and broadens the range of suitable forage plants. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture in good condition.

This map unit is moderately suited to woodland. The dominant trees are loblolly pine, shortleaf pine, Virginia pine, yellow-poplar, hickory, white oak, southern red oak, and post oak. The main understory plants are dogwood, sourwood, holly, eastern redcedar, black cherry, redbud, red maple, and sassafras. The main limitations are the sandy surface layer, droughtiness, and seedling mortality. The sandy surface layer restricts the use of wheeled equipment, especially when the soils are saturated. Using equipment that has wide tires, using crawler type equipment, and harvesting during the drier summer months help to overcome this limitation. Inadequate moisture in the soils can cause seedling mortality during the dry summer months. Planting high-quality seedlings and using proper seedling care and planting standards increase the seedling survival rate.

This map unit is moderately suited to urban uses. The slow permeability in the lower part of the Ailey soil is the main limitation. No significant limitations affect most recreational uses.

The capability subclass is IVs in areas of the Ailey soil and IIe in areas of the Appling soil. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8S in areas of the Ailey soil and 8A in areas of the Appling soil.

AgC—Ailey-Appling complex, 8 to 15 percent slopes, bouldery. This map unit consists mainly of very deep, well drained, strongly sloping Ailey and Appling soils on side slopes that are adjacent to intermittent drainageways. Rock fragments on the surface range from stones to boulders, are about 3 to 10 feet in size, and are about 50 to 500 feet apart. The unit is about 45 percent Ailey soil and 35 percent Appling soil. The two soils occur as areas so intricately mixed that mapping them separately is not practical at the selected scale. Individual areas generally are oblong, irregular in width, and range from 10 to more than 75 acres in size.

The Ailey soil is very deep over bedrock. It is well drained. Typically, the surface layer is brown loamy sand 7 inches thick. The subsurface layer is light yellowish brown loamy sand 18 inches thick. The subsoil is 33 inches thick. In the upper part, it is yellowish brown sandy loam. In the next part, it is yellowish brown sandy clay loam. In the lower part, it is mottled yellowish brown, very pale brown, and red sandy clay loam. The underlying material to a depth of 76 inches is mottled brownish yellow, red, and light gray

coarse sandy loam. In some small areas, the subsoil is clayey.

Permeability is slow in the Ailey soil. Available water capacity is low. Reaction is strongly acid or very strongly acid in the subsoil and underlying material. The shrink-swell potential is low. The hazard of erosion is moderate in bare or unprotected areas. The depth to bedrock is 6 feet or more.

The Appling soil is very deep over bedrock. It is well drained. Typically, the surface layer is brown loamy sand 6 inches thick. The subsurface layer is light yellowish brown sandy loam 8 inches thick. The subsoil is 38 inches thick. In the upper part, it is yellowish red clay loam. In the next part, it is yellowish red clay. In the lower part, it is mottled red and yellow sandy clay loam. The underlying material to a depth of 60 inches is multicolored sandy loam that weathered from saprolite. In some small areas, the surface layer is as much as 25 inches thick.

Permeability is moderate in the Appling soil. Available water capacity also is moderate. Reaction is very strongly acid or strongly acid in the subsoil and underlying material. The shrink-swell potential is low. The hazard of erosion is moderate in bare or unprotected areas. The depth to bedrock is more than 72 inches.

Included in this unit in mapping are small areas of soils that have bedrock within a depth of 40 inches and a few areas that are very stony or very bouldery. Contrasting inclusions make up about 15 percent of this map unit.

This map unit is mainly used as woodland. Some areas are used as pasture.

This map unit is poorly suited to cultivated crops. Stones and boulders on the surface severely restrict the use of tillage equipment. Droughtiness, the leaching of plant nutrients, soil blowing, and the slope also are limitations.

This map unit is moderately suited to pasture and hay. Stones and boulders on the surface restrict the use of equipment. A low amount of available water in the sandy surface layer reduces yields. Irrigation increases yields and broadens the range of suitable forage plants. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture in good condition.

This map unit is moderately suited to woodland. The dominant trees are loblolly pine, shortleaf pine, Virginia pine, yellow-poplar, hickory, white oak, southern red oak, and post oak. The main understory plants are dogwood, sourwood, holly, eastern redcedar, black cherry, redbud, red maple, and sassafras. The main limitations are the sandy surface layer, droughtiness, the slope, and the stones and boulders on the surface. The sandy surface layer restricts the use of wheeled equipment, especially when the soils are saturated. Using equipment that has wide tires, using crawler type equipment, and harvesting in the summer help to overcome this limitation. Inadequate moisture in the soils can cause seedling mortality during the dry summer months.

This map unit is poorly suited to urban development. The slope, the slow permeability in the Ailey soil, and the stones and boulders on the surface are the main limitations affecting urban uses. The hazard of erosion is severe on construction sites if the ground cover is removed. The slope and the stones and boulders on the surface are the main limitations affecting recreational uses.

The capability subclass is VIs in areas of the Ailey soil and IVe in areas of the Appling soil. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8S in areas of the Ailey soil and 8A in areas of the Appling soil.

ApB—Appling sandy loam, 2 to 8 percent slopes. This map unit consists mainly of very deep, well drained, gently sloping Appling and similar soils on smooth uplands. Individual areas generally are oblong, irregular in width, and range from 3 to more than 100 acres in size. Areas that are 3 to 10 acres in size are common on the narrower ridges.

Typically, the surface layer is brown sandy loam 6 inches thick. The subsurface layer is light yellowish brown sandy loam 3 inches thick. The subsoil is 44 inches thick. In the upper part, it is yellowish brown sandy clay loam. In the next part, it is strong brown clay that has yellowish brown and red mottles. In the lower part, it is mottled red and brownish yellow sandy clay loam. The underlying material to a depth of 66 inches is multicolored sandy clay loam that weathered from saprolite. In eroded areas where the upper part of the subsoil has been mixed with the surface soil by plowing, the surface layer is sandy clay loam. In some small areas, the surface layer is gravelly sandy loam. In other small areas, it is as much as 18 inches thick. In some areas the subsoil is red.

Included in this unit in mapping are small areas of Helena and Colfax soils. Helena soils are moderately well drained and are on toe slopes or in depressions. Colfax soils are somewhat poorly drained and are along drainageways. Also included are areas of soils that have a more plastic subsoil than the Appling soil. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is moderate in the Appling soil. Available water capacity also is moderate. Reaction is very strongly acid or strongly acid in the subsoil and

underlying material. It varies widely in the surface layer and subsurface layer as a result of local liming practices. The shrink-swell potential is low. The hazard of erosion is moderate in bare or unprotected areas. The depth to bedrock is more than 72 inches.

Most of this map unit is used as cropland, hayland, or pasture.

This map unit is well suited to cultivated crops. Corn, soybeans, grain sorghum, and small grain are the main crops. Tomatoes, sweet corn, green beans, and peas also are grown. The slope, surface runoff, and the hazard of erosion are the main management concerns affecting crop production. Conservation tillage, crop residue management, and cover crops, such as grasses and legumes, improve tilth and help to control runoff and erosion. Other conservation practices, such as sodded drainageways, diversions, stripcropping, field borders, and crop rotations that include close-growing crops, conserve soil and water.

This map unit is well suited to pasture and hay. Maintaining an adequate plant cover helps to control runoff and erosion.

This map unit is well suited to woodland. The dominant trees are loblolly pine, shortleaf pine, Virginia pine, yellow-poplar, hickory, white oak, and southern red oak. The main understory plants are dogwood, sourwood, holly, eastern redcedar, black cherry, redbud, red maple, and sassafras. No significant limitations affect woodland management.

This map unit is moderately suited to urban development. The moderate permeability and the clayey texture of the subsoil are the main limitations affecting urban uses. Erosion is a hazard on construction sites if the ground cover is removed. No significant limitations affect most recreational uses.

The capability subclass is IIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8A.

ApC—Appling sandy loam, 8 to 15 percent slopes. This map unit consists mainly of very deep, well drained, strongly sloping Appling and similar soils on side slopes that are adjacent to intermittent drainageways. Individual areas generally are oblong, irregular in width, and range from 3 to more than 25 acres in size.

Typically, the surface layer is brown sandy loam 6 inches thick. The subsurface layer is light yellowish brown sandy loam 3 inches thick. The subsoil is 44 inches thick. In the upper part, it is yellowish brown sandy clay loam. In the next part, it is strong brown clay that has yellowish brown and red mottles. In the lower part, it is mottled red and brownish yellow sandy clay loam. The underlying material to a depth of 66 inches is multicolored sandy clay loam that weathered from saprolite. In eroded areas where the upper part of the subsoil has been mixed with the surface soil by plowing, the surface layer is sandy clay loam. In some small areas, the surface layer is gravelly sandy loam. In other areas the subsoil is red.

Included in this unit in mapping are small areas of Helena and Colfax soils. Helena soils are moderately well drained and are on toe slopes. Colfax soils are somewhat poorly drained and are along drainageways. Also included are areas of soils that have a more plastic subsoil than the Appling soil. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is moderate in the Appling soil. Available water capacity also is moderate. Reaction is very strongly acid or strongly acid in the subsoil and underlying material. It varies widely in the surface layer and subsurface layer as a result of local liming practices. The shrink-swell potential is low. The hazard of erosion is severe in bare or unprotected areas. The depth to bedrock is more than 72 inches.

Most of this map unit is used as woodland, hayland, or pasture.

This map unit is moderately suited to cultivated crops. Corn, soybeans, grain sorghum, and small grain are the main crops. The slope, surface runoff, and the hazard of erosion are the main management concerns affecting crop production. Conservation tillage, crop residue management, and cover crops, such as grasses and legumes, improve tilth and help to control runoff and erosion. Other conservation practices, such as contour tillage, sodded drainageways, diversions, stripcropping, field borders, and crop rotations that include close-growing crops, conserve soil and water.

This map unit is well suited to pasture and hay. Maintaining an adequate plant cover helps to control runoff and erosion.

This map unit is well suited to woodland. The dominant trees are loblolly pine, shortleaf pine, Virginia pine, yellow-poplar, hickory, white oak, and southern red oak. The main understory plants are dogwood, sourwood, holly, eastern redcedar, black cherry, redbud, red maple, and sassafras. No significant limitations affect woodland management.

This map unit is poorly suited to urban development. The slope, the moderate permeability, and the clayey texture of the subsoil are the main limitations affecting most urban uses. The hazard of erosion is severe on construction sites if the ground cover is removed. The slope is the main limitation affecting recreational uses.

The capability subclass is IVe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8A.

AuB—Appling-Urban land complex, 2 to 8 percent slopes. This map unit occurs mainly as areas of a very deep, well drained Appling soil and areas of Urban land. It is about 60 percent Appling soil and 25 percent Urban land. The Appling soil and Urban land occur as areas so intricately mixed that mapping them separately is not practical at the selected scale. Individual areas are irregular in shape and range from 25 to 500 acres in size.

Typically, the surface layer of the Appling soil is brown sandy loam 6 inches thick. The subsurface layer is light yellowish brown sandy loam 3 inches thick. The subsoil is 44 inches thick. In the upper part, it is yellowish brown sandy clay loam. In the next part, it is strong brown clay that has yellowish brown and red mottles. In the lower part, it is mottled red and brownish yellow sandy clay loam. The underlying material to a depth of 66 inches is multicolored sandy clay loam that weathered from saprolite. In some areas the surface layer is sandy clay loam. In some small areas, the subsoil is red. In some places more than 20 inches of fill material covers the Appling soil. In other places more than two-thirds of the natural soil has been removed by cutting or grading.

Included in this unit in mapping are small areas of Helena and Colfax soils. Helena soils are moderately well drained and are on toe slopes or in depressions. Colfax soils are somewhat poorly drained and are along drainageways. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is moderate in the Appling soil. Available water capacity also is moderate. Reaction is very strongly acid or strongly acid in the subsoil and underlying material. It varies widely in the surface layer and subsurface layer as a result of local liming practices. The shrink-swell potential is low. The hazard of erosion is moderate in bare or unprotected areas. The depth to bedrock is more than 72 inches.

The Urban land consists of areas covered with streets, parking lots, and other structures. Most areas have been so altered that identification of a soil series is not feasible. In disturbed areas erosion is a hazard because of the slope and runoff. Surface runoff from rooftops and paved surfaces increases the hazard of flooding in low downstream areas. The clayey texture of the subsoil limits landscaping. The moderate permeability in the Appling soil is a limitation on sites for septic tank absorption fields. This limitation generally can be overcome by increasing the size of the absorption area. Onsite investigation generally is needed before use and management of this map unit can be planned.

The capability subclass is IIe in areas of the Appling soil and VIIIs in areas of the Urban land. This map unit has not been assigned a woodland ordination symbol.

BaB—Badin channery silt loam, 2 to 8 percent slopes. This map unit consists mainly of moderately deep, well drained, undulating Badin and similar soils on convex upland ridges that are highly dissected by intermittent drainageways. Individual areas are irregular in shape and range from 5 to more than 100 acres in size.

Typically, the surface layer is brown channery silt loam 7 inches thick. The subsoil is 21 inches thick. In the upper part, it is red silty clay. In the lower part, it is red channery silty clay loam that has yellow and strong brown mottles. Weathered, fractured slate bedrock is at a depth of about 28 inches. Hard, fractured slate bedrock is at a depth of 41 inches. In some eroded areas where the upper part of the subsoil has been mixed with the surface soil by plowing, the surface layer is reddish brown channery silty clay loam. In some other areas, the surface layer is silt loam.

Included in this unit in mapping are small areas of Goldston, Misenheimer, Cid, and Tatum soils. Goldston soils are shallow over bedrock. They are in areas where the topography is dissected, especially on knolls and short side slopes. Misenheimer soils are shallow over bedrock and are moderately well drained. Cid soils are moderately deep over bedrock and are moderately well drained and somewhat poorly drained. Misenheimer and Cid soils are in depressions and along intermittent drainageways. Tatum soils are deep over bedrock and are well drained. They commonly are in the larger mapped areas where the surface is smooth and less sloping. Also included are soils that have less clay in the subsoil than the Badin soil. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is moderate in the Badin soil. Available water capacity is low or moderate. Reaction ranges from strongly acid to extremely acid in the subsoil and underlying material. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is moderate. The hazard of erosion is moderate in bare or unprotected areas. Flat slate fragments on the surface create a mulch effect that helps to hold water in the soil and helps to control erosion. The depth to weathered bedrock ranges from 20 to 40 inches. The depth to hard bedrock is more than 40 inches.

This map unit is used mainly for crops or pasture. Some areas are wooded or used for urban development.

This map unit is moderately suited to cultivated crops. The major crops are corn, soybeans, and small grain. The slope, surface runoff, the limited available

water capacity, and the hazard of erosion are the main management concerns affecting crop production. Conservation tillage and crop residue management help to control runoff and erosion. Other conservation practices, such as sodded drainageways, stripcropping, and crop rotations that include close-growing crops, conserve soil and water.

This soil is well suited to hay and pasture. Proper management includes maintaining an adequate plant cover, reducing the runoff rate, and controlling erosion. Applications of fertilizer and controlled grazing are needed.

This map unit is well suited to woodland. The dominant trees are southern red oak, white oak, post oak, chestnut oak, scarlet oak, yellow-poplar, hickory, loblolly pine, shortleaf pine, and Virginia pine. The main understory plants are dogwood, sweetgum, blackgum, sourwood, American holly, eastern redcedar, black cherry, redbud, and red maple. No major limitations affect woodland management.

This map unit is moderately suited to urban development. The depth to bedrock, the clayey texture of the subsoil, the moderate shrink-swell potential, and low strength are the main limitations affecting most urban uses. The hazard is erosion is moderate on construction sites if the ground cover is removed. Small stones on the surface limit most recreational uses.

The capability subclass is IIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8D.

BaC—Badin channery silt loam, 8 to 15 percent slopes. This map unit consists mainly of moderately deep, well drained, rolling Badin and similar soils on convex side slopes that are adjacent to intermittent drainageways. Individual areas are irregular in shape and range from 4 to more than 50 acres in size.

Typically, the surface layer is brown channery silt loam 7 inches thick. The subsoil is 21 inches thick. In the upper part, it is red silty clay. In the lower part, it is red channery silty clay loam that has yellow and strong brown mottles. Weathered, fractured slate bedrock is at a depth of about 28 inches. Hard, fractured slate bedrock is at a depth of 41 inches. In some eroded areas where the upper part of the subsoil has been mixed with the surface soil by plowing, the surface layer is reddish brown channery silty clay loam. In some other areas, the surface layer is silt loam.

Included in this unit in mapping are small areas of Tatum, Goldston, Misenheimer, and Cid soils. Tatum soils are deep over bedrock and are well drained. They are on the broader, less dissected slopes. Goldston soils are shallow over bedrock. They are in areas where the topography is highly dissected, especially on knolls and short side slopes where ledges of bedrock are near the surface. Misenheimer soils are shallow over bedrock and are moderately well drained. Cid soils are moderately deep over bedrock and are moderately well drained and somewhat poorly drained. Misenheimer and Cid soils are along intermittent drainageways. Also included are soils that have less clay in the subsoil than the Badin soil. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is moderate in the Badin soil. Available water capacity is low or moderate. Reaction ranges from extremely acid to strongly acid in the subsoil and underlying material. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is moderate. The hazard of erosion is severe in bare or unprotected areas. Flat slate fragments on the surface create a mulch effect that helps to hold water in the soil and helps to control erosion. The depth to weathered bedrock ranges from 20 to 40 inches. The depth to hard bedrock is more than 40 inches.

This map unit is used mainly as woodland. Some areas are used for crops, hay, or pasture.

This map unit is moderately suited to cultivated crops. Corn, soybeans, small grain, and milo are the major crops. The slope, surface runoff, the limited available water capacity, and the hazard of erosion are the main management concerns affecting crop production. Conservation tillage and crop residue management help to control runoff and erosion. Other conservation practices, such as sodded drainageways, terraces and diversions, stripcropping, contour cultivation, field borders, and crop rotations that include close-growing crops, conserve soil and water.

This map unit is moderately suited to pasture and hay. Controlling runoff and erosion helps to maintain an adequate plant cover. Controlled grazing and adequate applications of fertilizer and lime are needed.

This map unit is well suited to woodland. The dominant trees are southern red oak, white oak, post oak, chestnut oak, scarlet oak, yellow-poplar, hickory, loblolly pine, shortleaf pine, and Virginia pine. The main understory plants are dogwood, sweetgum, blackgum, sourwood, American holly, eastern redcedar, black cherry, redbud, and red maple. No major limitations affect woodland management.

This map unit is poorly suited to urban development. The slope, low strength, the depth to bedrock, the clayey texture of the subsoil, and the moderate shrink-swell potential are the main limitations affecting most urban uses. The hazard of erosion is severe on construction sites if the ground cover is removed. The slope and small stones on the surface are the main limitations affecting most recreational uses.

The capability subclass is IIIe. Based on loblolly pine

as the indicator species, the woodland ordination symbol is 8D.

BdB2—Badin channery silty clay loam, 2 to 8 percent slopes, eroded. This map unit consists mainly of moderately deep, well drained, undulating Badin and similar soils on convex ridges that are dissected by intermittent drainageways in the uplands. Individual areas are irregular in shape and mostly range from 5 to more than 100 acres in size.

Typically, the surface layer is reddish brown channery silty clay loam 6 inches thick. The subsoil is 23 inches thick. In the upper part, it is red silty clay. In the lower part, it is red channery silty clay loam that has yellow and strong brown mottles. Weathered, fractured slate bedrock is at a depth of about 29 inches. Hard, fractured slate bedrock is at a depth of 41 inches. In some small uneroded areas, the surface soil is brown channery silt loam. In some other areas, the surface layer is silt loam.

Included in this unit in mapping are small areas of Goldston, Misenheimer, Cid, and Tatum soils. Goldston soils are shallow over bedrock. They are in areas where the topography is highly dissected, especially on knolls and short side slopes. Misenheimer soils are shallow over bedrock and are moderately well drained and somewhat poorly drained. Cid soils are moderately deep over bedrock and are moderately well drained and somewhat poorly drained. Misenheimer and Cid soils are in depressions and around the intermittent drainageways. Tatum soils are deep over bedrock and are well drained. They commonly are in the larger mapped areas and in the smoother, less sloping areas. Also included are soils that have less clay in the subsoil than the Badin soil. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is moderate in the Badin soil. Available water capacity is low or moderate. Reaction ranges from strongly acid to extremely acid in the subsoil and underlying material. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is moderate. The hazard of further erosion is moderate in bare or unprotected areas. Flat slate fragments on the surface create a mulch effect that helps to hold water in the soil and helps to control erosion. The depth to weathered bedrock ranges from 20 to 40 inches. The depth to hard bedrock is more than 40 inches.

This map unit is used mainly for crops or pasture. Some areas are wooded or used for urban development.

This map unit is moderately suited to cultivated crops. The major crops are corn, soybeans, and small grain. The slope, the content of clay in the surface layer, surface runoff, the limited available water capacity, and the hazard of erosion are the main management concerns affecting crop production. Because of the fairly high content of clay in the surface layer, good tilth is difficult to maintain and seed germination is restricted. Tillage is restricted after heavy rains. Conservation tillage, crop residue management, and cover crops, such as grasses and legumes, help to control runoff and erosion and improve tilth. Other conservation practices, such as sodded drainageways, stripcropping, and crop rotations that include close-growing crops, conserve soil and water.

This map unit is well suited to hay and pasture. Proper management includes maintaining an adequate plant cover, reducing the runoff rate, and controlling erosion. Applications of fertilizer and controlled grazing are needed.

This map unit is moderately suited to woodland. The dominant trees are post oak, yellow-poplar, white oak, loblolly pine, shortleaf pine, and Virginia pine. The main understory plants are dogwood, sweetgum, blackgum, sourwood, American holly, eastern redcedar, black cherry, redbud, and red maple. The main management concerns are the hazard of erosion, an equipment limitation, and seedling mortality because of the eroded surface layer. Limiting the use of equipment when the soil is wet minimizes compaction and reduces the hazard of erosion. Maintaining a plant cover also helps to control erosion.

This map unit is moderately suited to urban development. The depth to bedrock, the clayey texture of the subsoil, the moderate shrink-swell potential, and low strength are the main limitations affecting most urban uses. The hazard of erosion is severe on construction sites if the ground cover is removed. Small stones on the surface limit most recreational uses.

The capability subclass is IIIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 6D.

BdC2—Badin channery silty clay loam, 8 to 15 percent slopes, eroded. This map unit consists mainly of moderately deep, well drained, rolling Badin and similar soils on convex side slopes that are adjacent to intermittent drainageways. Individual areas are irregular in shape and range from 4 to more than 50 acres in size.

Typically, the surface layer is reddish brown channery silty clay loam 6 inches thick. The subsoil is 23 inches thick. In the upper part, it is red silty clay. In the lower part, it is red channery silty clay loam that has yellow and strong brown mottles. Weathered, fractured slate bedrock is at a depth of about 29 inches. Hard, fractured slate bedrock is at a depth of 41 inches. In

some small uneroded areas, the surface layer is brown channery silt loam.

Included in this unit in mapping are small areas of Goldston, Tatum, Misenheimer, and Cid soils. Goldston soils are shallow over bedrock. They are in areas where the topography is dissected, especially on knolls and short side slopes where ledges of bedrock are near the surface. Tatum soils are deep over bedrock and are well drained. They are on the broader, less dissected slopes. Misenheimer soils are shallow over bedrock and are moderately well drained. Cid soils are moderately deep over bedrock and are moderately well drained and somewhat poorly drained. Misenheimer and Cid soils are along intermittent drainageways. Also included are soils that have less clay in the subsoil than the Badin soil. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is moderate in the Badin soil. Available water capacity is low or moderate. Reaction ranges from strongly acid to extremely acid in the subsoil and underlying material. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is moderate. The hazard of further erosion is severe in bare or unprotected areas. Flat slate fragments on the surface create a mulch effect that helps to hold water in the soil and helps to control erosion. The depth to weathered bedrock ranges from 20 to 40 inches. The depth to hard bedrock is more than 40 inches.

This map unit is used mainly as woodland. Some areas are used for crops, hay, or pasture.

This map unit is poorly suited to cultivated crops because of the slope and the eroded surface layer. The hazard of further erosion is very severe.

This map unit is moderately suited to pasture and hay. Proper pasture management includes controlled grazing and adequate applications of fertilizer and lime.

This map unit is moderately suited to woodland. The dominant trees are post oak, yellow-poplar, white oak, loblolly pine, shortleaf pine, and Virginia pine. The main understory plants are dogwood, sweetgum, blackgum, sourwood, American holly, eastern redcedar, black cherry, redbud, and red maple. The main management concerns are the hazard of erosion, an equipment limitation, and seedling mortality because of the eroded surface layer. Limiting the use of equipment when the soil is wet minimizes compaction and reduces the hazard of erosion. Maintaining a plant cover also helps to control erosion.

This map unit is poorly suited to urban development. The slope, low strength, the depth to bedrock, the clayey texture of the subsoil, and the moderate shrink-swell potential are the main limitations affecting most urban uses. The hazard of erosion is very severe on construction sites if the ground cover is removed. The slope and small stones on the surface are the main limitations affecting most recreational uses.

The capability subclass is IVe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 6D.

BuB—Badin-Urban land complex, 2 to 8 percent slopes. This map unit occurs mainly as areas of a moderately deep, well drained, undulating Badin soil and areas of Urban land. It is about 60 percent Badin soil and 25 percent Urban land. The Badin soil and Urban land occur as areas so intricately mixed that mapping them separately is not practical at the selected scale. Individual areas are irregular in shape and range from 25 to 500 acres in size.

Typically, the surface layer of the Badin soil is reddish brown channery silty clay loam 6 inches thick. The subsoil is 23 inches thick. In the upper part, it is red silty clay. In the lower part, it is red channery silty clay loam that has yellow and strong brown mottles. Weathered, fractured slate bedrock is at a depth of about 29 inches. Hard, fractured slate bedrock is at a depth of 41 inches. In some small uneroded areas, the surface layer is brown channery silt loam. In some places more than 20 inches of fill material covers the Badin soil. In other places more than two-thirds of the natural soil has been removed by cutting and grading.

Included in this unit in mapping are small areas of Goldston, Cid, and Tatum soils. Goldston soils are shallow over bedrock. They are in areas where the topography is highly dissected, especially on knolls and short side slopes. Cid soils are moderately deep over bedrock and are moderately well drained and somewhat poorly drained. They are in depressional areas and along intermittent drainageways. Tatum soils are deep over bedrock and are well drained. They are on the smoother slopes near the center of ridges. Also included are soils that have less clay in the subsoil than the Badin soil. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is moderate in the Badin soil. Available water capacity is low or moderate. Reaction ranges from strongly acid to extremely acid in the subsoil and underlying material. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is moderate. The hazard of erosion is severe in bare or unprotected areas. Flat slate fragments on the surface create a mulch effect that helps to hold water in the soil and helps to control erosion. The depth to weathered bedrock ranges from 20 to 40 inches. The depth to hard bedrock is more than 40 inches.

The Urban land consists of areas where the original soil has been cut, filled, graded, or otherwise altered.

These areas are used for closely spaced houses or other buildings or are covered with pavement. The slope generally has been modified. Surface runoff from rooftops and paved surfaces increases the hazard of flooding in low downstream areas. The depth to bedrock, the clayey texture of the subsoil, low strength, and the moderate shrink-swell potential in the Badin soil are the main limitations affecting most urban uses. Onsite investigation is generally needed before use and management of these areas can be planned.

The capability subclass is IIIe in areas of the Badin soil and VIIIs in areas of the Urban land. This map unit has not been assigned a woodland ordination symbol.

BuC—Badin-Urban land complex, 8 to 15 percent slopes. This map unit occurs mainly as areas of a moderately deep, well drained, sloping Badin soil and areas of Urban land. It is about 65 percent Badin soil and 20 percent Urban land. The Badin soil and Urban land occur as areas so intricately mixed that mapping them separately is not practical at the selected scale. Individual areas are irregular in shape and range from 5 to 500 acres in size.

Typically, the surface layer of the Badin soil is reddish brown channery silty clay loam 6 inches thick. The subsoil is 23 inches thick. In the upper part, it is red silty clay. In the lower part, it is red channery silty clay loam that has yellow and strong brown mottles. Weathered, highly fractured slate bedrock is at a depth of about 29 inches. Hard, fractured slate bedrock is at a depth of 41 inches. In some small uneroded areas, the surface layer is brown channery silt loam. In some places more than 20 inches of fill material covers the Badin soil. In other places more than two-thirds of the natural soil has been removed by cutting and grading.

Included in this unit in mapping are small areas of Goldston, Cid, and Tatum soils. Goldston soils are shallow over bedrock. They are on short, broken side slopes. Cid soils are moderately well drained and somewhat poorly drained. They are along intermittent drainageways. Tatum soils are deep over bedrock and are well drained. They are on the broader, less complex side slopes. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is moderate in the Badin soil. Available water capacity is low or moderate. Reaction ranges from strongly acid to extremely acid in the subsoil. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is moderate. The hazard of erosion is severe in bare or unprotected areas. Flat slate fragments on the surface create a mulch effect that helps to hold water in the soil and helps to control erosion. The depth to weathered bedrock ranges from 20 to 40 inches. The depth to hard bedrock is more than 40 inches.

The Urban land consists of areas where the original soil has been cut, filled, graded, or otherwise altered to the extent that a soil series cannot be identified. These areas are used for closely spaced houses or other buildings or are covered with pavement. The slope generally has been modified.

Surface runoff from rooftops and paved surfaces increases the hazard of flooding in low downstream areas. The depth to bedrock, the slope, the clayey texture of the subsoil, low strength, and the moderate shrink-swell potential in the Badin soil are the main limitations affecting most urban uses. Onsite investigation is generally needed before use and management of these areas can be planned.

The capability subclass is IVe in areas of the Badin soil and VIIIs in areas of the Urban land. This map unit has not been assigned a woodland ordination symbol.

CeB2—Cecil gravelly sandy clay loam, 2 to 8 percent slopes, eroded. This map unit consists mainly of very deep, well drained, gently sloping Cecil and similar soils on ridges that are dissected by intermittent drainageways. It is in slightly convex areas. Individual areas generally are oblong, vary in width, and range from 3 to more than 150 acres in size. Areas that are less than 20 acres in size are common on the narrower ridges.

Typically, the surface layer is yellowish red gravelly sandy clay loam 6 inches thick. The subsoil is 48 inches thick. In the upper part, it is red clay. In the lower part, it is red clay loam that has reddish yellow mottles. The underlying material to a depth of 72 inches is red loam that weathered from saprolite. In some small areas, the surface layer is sandy clay loam. In some uneroded areas, it is gravelly sandy loam. In some severely eroded areas, it is gravelly clay loam.

Included in this unit in mapping are small areas of Appling, Gaston, Mecklenburg, and Georgeville soils. Appling and Gaston soils are very deep over bedrock and are well drained. They commonly are in the larger mapped areas that have a smooth surface. Mecklenburg soils are very deep over bedrock and are well drained. These included Mecklenburg soils are in areas adjacent to map units named as Mecklenburg soils. Georgeville soils are very deep over bedrock and are well drained. They are on broad, smooth slopes. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is moderate in the Cecil soil. Available water capacity also is moderate. Reaction is strongly acid or very strongly acid in the subsoil and underlying material. It varies widely in the surface layer as a result

of local liming practices. The shrink-swell potential is low. The hazard of further erosion is moderate in bare or unprotected areas. The depth to bedrock is more than 60 inches.

This map unit is used as cropland, hayland, pasture, or woodland.

This map unit is moderately suited to cultivated crops. Corn, soybeans, grain sorghum, and small grain are the main crops. The slope, the content of clay in the surface layer, and surface runoff are the main limitations affecting crop production. Because of the relatively high content of clay in the surface layer, this soil is somewhat difficult to till and seed germination is restricted. Tillage is restricted after heavy rains.

Conservation tillage, crop residue management, and cover crops, such as grasses and legumes, improve tilth and help to control runoff and erosion. Other conservation practices, such as sodded drainageways, diversions, stripcropping, field borders, and crop rotations that include close-growing crops, conserve soil and water.

This map unit is well suited to pasture and hay. Maintaining an adequate plant cover helps to control runoff and erosion. Proper applications of fertilizer and lime and controlled grazing are essential.

This map unit is well suited to woodland. The dominant trees are loblolly pine, shortleaf pine, Virginia pine, yellow-poplar, hickory, white oak, southern red oak, post oak, and scarlet oak. The main understory trees are dogwood, sourwood, American holly, eastern redcedar, black cherry, red maple, redbud, and sassafras. The main management concerns are the hazard of erosion, an equipment limitation, and seedling mortality because of the eroded surface layer. Limiting the use of equipment when the soil is wet minimizes compaction and reduces the hazard of erosion. Maintaining a plant cover also helps to control erosion.

This map unit is moderately suited to urban development. The moderate permeability, the clayey texture of the subsoil, and low strength are the main limitations affecting most urban uses. The hazard of erosion is severe on construction sites if the ground cover is removed. Small stones on the surface limit most recreational uses.

The capability subclass is IIIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 7C.

CeC2—Cecil gravelly sandy clay loam, 8 to 15 percent slopes, eroded. This map unit consists mainly of very deep, well drained, strongly sloping Cecil and similar soils on slightly convex, narrow side slopes in the uplands. It is generally adjacent to streams. Individual areas are long, vary in width, and range from 5 to 50 acres in size.

Typically, the surface layer is yellowish red gravelly sandy clay loam 6 inches thick. The subsoil is 48 inches thick. In the upper part, it is red clay. In the lower part, it is red clay loam that has reddish yellow mottles. The underlying material to a depth of 72 inches is red loam that weathered from saprolite. In some small areas, the surface layer is sandy clay loam. In some severely eroded areas, it is gravelly clay loam.

Included in this unit in mapping are small areas of Appling, Gaston, Pacolet, and Tatum soils. Appling and Gaston soils are very deep over bedrock and are well drained. They are on the broader, smoother side slopes. Pacolet soils are very deep over bedrock and are well drained. They are on the steeper, more broken slopes. Tatum soils are deep over bedrock and are well drained. They are on narrow slopes. Contrasting inclusions make up about 20 percent of this map unit.

Permeability is moderate in the Cecil soil. Available water capacity also is moderate. Reaction is strongly acid or very strongly acid in the subsoil and underlying material. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is low. The hazard of further erosion is severe in bare or unprotected areas. The depth to bedrock is more than 60 inches.

This map unit is used mainly as woodland or pasture. Some areas are used as cropland.

This map unit is moderately suited to cultivated crops. The major crops are corn, soybeans, and small grain. Surface runoff, the content of clay in the surface layer, the slope, and the hazard of erosion are the main management concerns affecting crop production.

Because of the relatively high content of clay in the surface layer, this soil is somewhat difficult to till and seed germination is restricted. Tillage is restricted after heavy rains. Conservation tillage, crop residue management, and cover crops, such as grasses and legumes, improve tilth and help to control runoff and erosion. Other conservation practices, such as sodded drainageways, terraces and diversions, stripcropping, field borders, and crop rotations that include close-growing crops, conserve soil and water.

This map unit is moderately suited to pasture and hay. Maintaining an adequate plant cover helps to control runoff and erosion. Proper applications of fertilizer and lime and controlled grazing are essential.

This map unit is well suited to woodland. The dominant trees are loblolly pine, shortleaf pine, Virginia pine, yellow-poplar, hickory, white oak, southern red oak, post oak, and scarlet oak. The understory includes flowering dogwood, sourwood, American holly, eastern redcedar, black cherry, red maple, redbud, and

sassafras. The main management concerns are the hazard of erosion, an equipment limitation, and seedling mortality because of the eroded surface layer. Limiting the use of equipment when the soil is wet minimizes compaction and reduces the hazard of erosion. Maintaining a plant cover also helps to control erosion.

This map unit is moderately suited to urban development. The slope, the moderate permeability, the clayey texture of the subsoil, and low strength are the main limitations affecting most urban uses. The hazard of erosion is very severe on construction sites if the ground cover is removed. Small stones on the surface and the slope are the main limitations affecting most recreational uses.

The capability subclass is IVe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 7C.

ChA—Chewacla silt loam, 0 to 2 percent slopes, frequently flooded. This map unit consists mainly of very deep, nearly level, somewhat poorly drained Chewacla and similar soils on flood plains. It is mostly on broad flats along the major streams and on narrow flats along minor creeks and drainageways. These soils are frequently flooded for brief periods, particularly from November to April. Individual areas are generally long and narrow and range from 25 to more than 200 acres in size.

Typically, the surface layer is brown silt loam 7 inches thick. The subsoil is 45 inches thick. In the upper part, it is light yellowish brown silt loam that has yellowish brown mottles. In the next part, it is yellowish brown loam that has light brownish gray mottles. In the lower part, it is light brownish gray silty clay loam that has yellowish brown mottles. The underlying material to a depth of 72 inches is light gray loamy fine sand that has yellowish brown and dark yellowish brown mottles. In some areas on small ridges adjacent to the streams, the surface layer is sandy loam.

Included in this unit in mapping are small areas of poorly drained soils in depressions. Also included are small areas of well drained sandy soils that are on narrow, convex ridges adjacent to the streams. These soils are at the slightly higher elevations. Where this unit is adjacent to areas of Goldston soils, small areas of soils that have bedrock at a depth of less than 60 inches also are included. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is moderate in the Chewacla soil. Available water capacity is high. Reaction ranges from very strongly acid to neutral in the surface layer and the upper part of the subsoil. It varies widely in the surface layer as a result of local liming practices. It ranges from very strongly acid to slightly alkaline in the lower part of the subsoil and in the underlying material. The shrink-swell potential is low. A seasonal high water table fluctuates between depths of 0.5 foot and 1.5 feet from November through April. The depth to bedrock ranges from 5 feet to more than 10 feet.

Most of this map unit is used as woodland. Areas that have been cleared of trees are used for crops, hay, or pasture.

This map unit is well suited to cultivated crops, such as corn and soybeans. These crops may be damaged by the flooding. The flooding, however, does not normally occur during the growing season. Disposal of surface and subsurface water is a limitation. A lack of suitable outlets limits the installation of a drainage system. Conservation tillage, cover crops, and the use of grasses and legumes in the cropping system help to maintain tilth and production.

If drained, this map unit is well suited to hay and pasture. Proper management includes applying fertilizer and lime as needed, controlling grazing, and maintaining a drainage system.

This map unit is well suited to woodland. The dominant trees are loblolly pine, yellow-poplar, American sycamore, sweetgum, water oak, willow oak, blackgum, and green ash. The main understory plants are cottonwood, hornbeam, alder, and red maple. The wetness and the frequent flooding are the main limitations. Harvesting activities are restricted to dry periods.

This map unit is not suited to urban development or recreational uses. The wetness and the flooding are the main limitations.

The capability subclass is IVw. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 7W.

CmB—Cid channery silt loam, 1 to 5 percent slopes. This map unit consists mainly of moderately deep, moderately well drained and somewhat poorly drained, nearly level and gently sloping Cid and similar soils on flats, on ridges in the uplands, in depressions, and at the head of intermittent drainageways. Individual areas are irregular in shape and range from 4 to more than 200 acres in size. Areas at the head of intermittent drainageways generally are less than 20 acres in size.

Typically, the surface layer is light brownish gray channery silt loam 4 inches thick. The subsurface layer is pale yellow channery silt loam 5 inches thick. The subsoil is 18 inches thick. In the upper part, it is brownish yellow silty clay loam that has pale yellow mottles. In the next part, it is light olive brown silty clay that has light brownish gray mottles. In the lower part, it is mottled grayish brown and light olive brown channery silty clay. Weathered, fractured slate bedrock is at a

depth of about 27 inches. Hard, fractured slate bedrock is at a depth of about 32 inches. In some small areas, the surface layer is silt loam. In other areas the subsoil has less clay.

Included in this unit in mapping are small areas of Secrest, Misenheimer, and Badin soils. Secrest soils are deep over bedrock. They are in broad, nearly level areas. Misenheimer soils are shallow over bedrock. They are in slightly elevated areas where ledges of bedrock are at or near the surface. Badin soils are well drained and are on small knolls and ridges. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is slow in the Cid soil. Available water capacity is low or moderate. Reaction ranges from strongly acid to extremely acid in the subsoil and underlying material. It varies widely in the surface layer and subsurface layer as a result of local liming practices. The shrink-swell potential is moderate. A seasonal high water table is perched between depths of 1.5 and 2.5 feet from December through May. The depth to hard bedrock ranges from 20 to 40 inches.

This map unit is used mainly as cropland, pasture, or woodland.

This map unit is moderately suited to cultivated crops, such as corn, soybeans, small grain, and milo. The wetness and the slow permeability are the main limitations affecting crop production. In years of low rainfall, this soil is among the most productive soils in the county. In years of above average rainfall, crops may drown. A drainage system may be needed to remove surface and subsurface water. Grassed waterways can maintain open drainage channels and remove surface water. Other applicable conservation practices are conservation tillage, crop residue management, diversions, field borders, and crop rotations.

This map unit is well suited to hay and pasture. The wetness and the slow permeability are the main limitations. Controlled grazing and applications of fertilizer are needed.

This map unit is well suited to woodland. The dominant trees are white oak, southern red oak, willow oak, blackjack oak, scarlet oak, post oak, shortleaf pine, Virginia pine, and loblolly pine. The main understory plants are blackgum, sweetgum, eastern redcedar, and red maple. The main limitation is the seasonal high water table, which restricts the use of equipment to dry periods.

This map unit is poorly suited to urban development. The wetness, the depth to bedrock, low strength, the slow permeability, and the moderate shrink-swell potential are the main limitations affecting most urban uses. The hazard of erosion is moderate on construction sites if the ground cover is removed. The wetness and the slow permeability are the main limitations affecting recreational uses.

The capability subclass is IIe. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 6W.

CnB—Cid-Urban land complex, 1 to 5 percent slopes. This map unit occurs mainly as areas of a moderately deep, moderately well drained and somewhat poorly drained Cid soil and areas of Urban land. It is about 60 percent Cid soil and 25 percent Urban land. The Cid soil and Urban land occur as areas so intricately mixed that mapping them separately is not practical at the selected scale. Individual areas are irregular in shape and range from 25 to 500 acres in size.

Typically, the surface layer of the Cid soil is light brownish gray channery silt loam 4 inches thick. The subsurface layer is pale yellow channery silt loam 5 inches thick. The subsoil is 18 inches thick. In the upper part, it is brownish yellow silty clay loam that has pale yellow mottles. In the next part, it is light olive brown silty clay that has light brownish gray mottles. In the lower part, it is mottled grayish brown and light olive brown channery silty clay. Weathered, fractured slate bedrock is at a depth of about 27 inches. Hard, fractured slate bedrock is at a depth of about 32 inches. In some areas the surface layer is silt loam. In other areas the subsoil has less clay. In some places more than 20 inches of fill material covers the Cid soil. In other places more than two-thirds of the natural soil has been removed by cutting and grading.

Included in this unit in mapping are small areas of Misenheimer, Secrest, and Badin soils. Misenheimer soils are shallow over bedrock and are moderately well drained. They are in areas where the topography is highly dissected, especially on knolls and short side slopes. Secrest soils are deep over bedrock. They are in broad, nearly level areas. Badin soils are well drained and are on small knolls and ridges. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is slow in the Cid soil. Available water capacity is low or moderate. Reaction ranges from strongly acid to extremely acid in the subsoil and underlying material. It varies widely in the surface layer and subsurface layer as a result of local liming practices. The shrink-swell potential is moderate. A seasonal high water table is perched between depths of 1.5 and 2.5 feet from December through May. The depth to bedrock ranges from 20 to 40 inches.

The Urban land consists of areas where the original soil has been cut, filled, graded, or otherwise altered. These areas are used for closely spaced houses or other buildings or are covered with pavement. The

slope generally has been modified. Surface runoff from rooftops and paved surfaces increases the hazard of flooding in lower downstream areas. The depth to bedrock, the clayey texture of the subsoil, low strength, and the moderate shrink-swell potential in the Cid soil are the main limitations affecting most urban uses. Onsite investigation is generally needed before use and management of these areas can be planned.

The capability subclass is IIe in areas of the Cid soil and VIIIs in areas of the Urban land. This map unit has not been assigned a woodland ordination symbol.

CoA—Colfax sandy loam, 0 to 3 percent slopes. This map unit consists mainly of very deep, somewhat poorly drained Colfax and similar soils in depressions, at the head of intermittent streams, and on toe slopes in the uplands. The slopes are slightly concave. Individual areas are irregular in shape and range from 4 to 25 acres in size.

Typically, the surface layer is light brownish gray sandy loam 7 inches thick. The subsurface layer is light gray sandy loam 7 inches thick. The subsoil is 34 inches thick. In the upper part, it is brownish yellow sandy clay loam that has gray mottles. In the next part, it is mottled brownish yellow and gray sandy clay loam. In the lower part, it is brownish yellow sandy loam that has light gray mottles. The lower part is a very firm, brittle fragipan. The underlying material extends to a depth of 61 inches. It is mottled light gray, very pale brown, and brownish yellow sandy loam that weathered from saprolite. Weathered, multicolored granite is at a depth of about 61 inches. Hard granite is at a depth of 65 inches. In some places the surface soil is as much as 18 inches thick.

Included in this unit in mapping are small areas of Appling and Helena soils. Appling soils are very deep over bedrock and are well drained. Helena soils are very deep over bedrock and are moderately well drained. Appling and Helena soils commonly are on toe slopes. Also included are some small areas of poorly drained soils in depressions. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is slow in the Colfax soil. Available water capacity is moderate. Reaction ranges from extremely acid to strongly acid in the subsoil and underlying material. It varies widely in the surface layer and subsurface layer as a result of local liming practices. The shrink-swell potential is moderate. A seasonal high water table is perched between depths of 0.5 foot and 1.5 feet from November through June. A fragipan is between depths of 16 and 36 inches. The depth to weathered bedrock ranges from 40 to 60 inches. The depth to hard bedrock is more than 60 inches.

This map unit is used mainly as cropland, woodland, or pasture.

This map unit is well suited to corn, soybeans, and milo. The wetness and the slow permeability are the main limitations affecting crop production. In years of above average rainfall, crops may drown. A drainage system may be needed to remove surface and subsurface water. Grassed waterways can maintain open drainage channels and remove surface water. Other applicable conservation practices are conservation tillage, crop residue management, diversions, field borders, and crop rotations.

This map unit is well suited to hay and pasture. The wetness and the slow permeability are the main limitations. Controlled grazing and applications of fertilizer are needed.

This map unit is well suited to woodland. The dominant trees are loblolly pine, yellow-poplar, shortleaf pine, and sweetgum. The main understory plants are cottonwood, dogwood, sourwood, birch, alder, and red maple. The main limitation is the seasonal high water table, which restricts the use of equipment to dry periods.

This map unit is poorly suited to urban development. The wetness, the slow permeability, the moderate shrink-swell potential, and low strength are the main limitations affecting urban uses. The wetness is the main limitation affecting recreational uses.

The capability subclass is IIIw. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8W.

CrB—Creedmoor loam, 2 to 8 percent slopes. This map unit consists mainly of very deep, moderately well drained and somewhat poorly drained, slightly undulating Creedmoor and similar soils on broad ridges in the uplands. It is in slightly convex areas. Individual areas are irregular in shape and range from 4 to more than 50 acres in size.

Typically, the surface layer is yellowish brown loam 7 inches thick. The subsurface layer is very pale brown loam 3 inches thick. The subsoil is 40 inches thick. In the upper part, it is brownish yellow sandy clay loam that has very pale brown mottles. In the next part, it is yellowish brown clay that has light gray mottles. In the lower part, it is mottled light gray, yellowish brown, and yellowish red clay loam. The underlying material extends to a depth of 56 inches. It is dark reddish brown sandy clay loam. Weathered, fine grained sandstone bedrock is at a depth of about 56 inches. Hard sandstone bedrock is at a depth of 62 inches. In some areas the surface layer is gravelly loam.

Included in this unit in mapping are small areas of the very deep, moderately well drained White Store

soils. These soils are in the higher parts of the mapped areas. Also included in mapping are small areas of soils that have less clay in the subsoil than the Creedmoor soil and small areas of well drained soils. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is very slow in the Creedmoor soil. Available water capacity is moderate. Reaction ranges from extremely acid to strongly acid in the subsoil and underlying material. It varies widely in the surface layer and subsurface layer as a result of local liming practices. The shrink-swell potential is moderate. A seasonal high water table is perched between depths of 1.5 and 2.0 feet from January through March. The hazard of erosion is moderate in bare or unprotected areas. The depth to weathered bedrock ranges from 40 to 60 inches. The depth to hard bedrock is more than 60 inches.

Most of this map unit is used as cropland, hayland, pasture, or woodland.

This map unit is well suited to cultivated crops. Corn, soybeans, grain sorghum, and small grain are the main crops. The slope, the very slow permeability, the wetness, surface runoff, and the hazard of erosion are the main management concerns affecting crop production. Because of the very slow permeability, tillage is restricted after heavy rains. Conservation tillage, crop residue management, and cover crops, such as grasses and legumes, improve tilth and help to control runoff and erosion. A surface drainage system may be needed in the less sloping areas. Other conservation practices, such as sodded drainageways, diversions, stripcropping, field borders, and crop rotations that include close-growing crops, conserve soil and water.

This map unit is well suited to pasture and hay. Maintaining an adequate plant cover helps to control runoff and erosion.

This map unit is well suited to woodland. The dominant trees are loblolly pine, shortleaf pine, sweetgum, Virginia pine, red maple, and water oak. The main understory trees are eastern redcedar, dogwood, holly, and black cherry. This unit has slight limitations affecting woodland management.

This map unit is poorly suited to urban uses. The wetness, low strength, and the slow permeability are the main limitations affecting most urban uses. The hazard of erosion is moderate on construction sites if the ground cover is removed. The slow permeability and the wetness are the main limitations affecting most recreational uses.

The capability subclass is IIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 9A.

GaB2—Gaston clay loam, 2 to 8 percent slopes, eroded. This map unit consists mainly of very deep, well drained, gently sloping Gaston and similar soils on ridges that are dissected by intermittent drainageways. It is in slightly convex areas. Individual areas generally are oblong, vary in width, and range from 4 to more than 50 acres in size. Areas that are less than 20 acres in size are common on the narrower ridges.

Typically, the surface layer is dark reddish brown clay loam 7 inches thick. The subsoil is 52 inches thick. In the upper part, it is dark red clay. In the next part, it is red clay that has yellowish brown mottles. In the lower part, it is red clay loam that has reddish brown mottles. The underlying material to a depth of 96 inches is multicolored loam that weathered from saprolite. In some small areas, the surface layer is sandy clay loam or gravelly clay loam. In uneroded areas it is loam. In other small areas, the subsoil is light red.

Included in this unit in mapping are small areas of Cecil and Mecklenburg soils. Cecil soils are very deep over bedrock and are well drained. They commonly are in the larger mapped areas that have a smooth surface. Mecklenburg soils are very deep over bedrock and are well drained. These included Mecklenburg soils are in areas adjacent to map units named as Mecklenburg soils. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is moderate in the Gaston soil. Available water capacity also is moderate. Reaction ranges from strongly acid to slightly acid in the subsoil and underlying material. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is moderate. The hazard of further erosion is moderate in bare or unprotected areas. The depth to weathered bedrock ranges from 40 to 60 inches. The depth to hard bedrock is more than 60 inches.

This map unit is used as cropland, hayland, pasture, or woodland.

This map unit is moderately suited to cultivated crops. Corn, soybeans, grain sorghum, and small grain are the main crops. The slope, the content of clay in the surface layer, and surface runoff are the main limitations affecting crop production. Because of the relatively high content of clay in the surface layer, this soil is somewhat difficult to till and seed germination is restricted. Tillage is restricted after heavy rains. Conservation tillage, crop residue management, and cover crops, such as grasses and legumes, improve tilth and help to control runoff and erosion. Other conservation practices, such as sodded drainageways, diversions, stripcropping, field borders, and crop rotations that include close-growing crops, conserve soil and water.

This map unit is well suited to pasture and hay.

Maintaining an adequate plant cover helps to control runoff and erosion. Proper applications of fertilizer and lime and controlled grazing are essential.

This map unit is well suited to woodland. The dominant trees are loblolly pine, shortleaf pine, Virginia pine, yellow-poplar, hickory, white oak, and southern red oak. The main understory trees are dogwood, sourwood, holly, eastern redcedar, black cherry, red maple, redbud, and sassafras. The main management concerns are an equipment limitation and seedling mortality because of the eroded surface layer. Limiting the use of equipment when the soil is wet minimizes compaction and reduces the hazard of erosion. Maintaining a plant cover also helps to control erosion.

This map unit is moderately suited to urban development. Low strength, the moderate permeability, the moderate shrink-swell potential, and the clayey texture of the subsoil are the main limitations affecting most urban uses. The hazard of erosion is severe on construction sites if the ground cover is removed. This map unit has slight limitations affecting most recreational uses.

The capability subclass is IIIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8C.

GaC2—Gaston clay loam, 8 to 15 percent slopes, eroded. This map unit consists mainly of very deep, well drained, strongly sloping Gaston and similar soils on narrow side slopes in the uplands. It is in slightly convex areas, generally adjacent to streams. Individual areas are long, vary in width, and range from 4 to more than 30 acres in size.

Typically, the surface layer is dark reddish brown clay loam 7 inches thick. The subsoil is 52 inches thick. In the upper part, it is dark red clay. In the next part, it is red clay that has yellowish brown mottles. In the lower part, it is red clay loam that has reddish brown mottles. The underlying material to a depth of 96 inches is multicolored loam that weathered from saprolite. In uneroded areas the surface layer is loam. In other areas it is gravelly clay loam. In some small areas, the subsoil is red.

Included in this unit in mapping are small areas of Cecil and Mecklenburg soils. Cecil soils are very deep over bedrock and are well drained. They are on the broader, smoother side slopes. Mecklenburg soils are very deep over bedrock and are well drained. They are on the more complex slopes. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is moderate in the Gaston soil. Available water capacity also is moderate. Reaction ranges from strongly acid to slightly acid in the subsoil and underlying material. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is moderate. The hazard of further erosion is severe in bare or unprotected areas. The depth to bedrock is more than 60 inches.

This map unit is used mainly as woodland or pasture. Some areas are used as cropland.

This map unit is moderately suited to cultivated crops. The major crops are corn, soybeans, and small grain. Surface runoff, the content of clay in the surface layer, the slope, and the hazard of erosion are the main management concerns affecting crop production. Because of the relatively high content of clay in the surface layer, this soil is difficult to till and seed germination is restricted. Tillage is restricted after heavy rains. Conservation tillage, crop residue management, and cover crops, such as grasses and legumes, improve tilth and help to control runoff and erosion. Other conservation practices, such as sodded drainageways, terraces and diversions, stripcropping, field borders, and crop rotations that include close-growing crops, conserve soil and water.

This map unit is moderately suited to pasture and hay. Maintaining an adequate plant cover helps to control runoff and erosion. Proper applications of fertilizer and lime and controlled grazing are essential.

This map unit is well suited to woodland. The dominant trees are loblolly pine, shortleaf pine, Virginia pine, yellow-poplar, hickory, white oak, and southern red oak. The main understory species are dogwood, sourwood, holly, eastern redcedar, black cherry, red maple, redbud, and sassafras. The main management concerns are the hazard of erosion, an equipment limitation, and seedling mortality because of the eroded surface layer. Limiting the use of equipment when the soil is wet minimizes compaction and reduces the hazard of erosion. Maintaining a plant cover also helps to control erosion.

This map unit is poorly suited to urban development. The slope, the moderate permeability, the moderate shrink-swell potential, the clayey texture of the subsoil, and low strength are the main limitations affecting most urban uses. The hazard of erosion is very severe on construction sites if the ground cover is removed. The slope is the main limitation affecting most recreational uses.

The capability subclass is IVe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8C.

GeB—Georgeville silt loam, 2 to 8 percent slopes. This map unit consists mainly of very deep, well drained, gently sloping Georgeville and similar soils on ridges that are dissected by intermittent drainageways. It is in slightly convex areas. Individual areas generally

are oblong, vary in width, and range from 4 to more than 20 acres in size.

Typically, the surface layer is brown silt loam 7 inches thick. The subsoil is 53 inches thick. In the upper part, it is red clay. In the next part, it red silty clay that has strong brown mottles. In the lower part, it is red silty clay loam that has reddish yellow mottles. The underlying material to a depth of 84 inches is multicolored silt loam that weathered from saprolite. In some small areas, the surface layer is gravelly silt loam. In some eroded areas where the upper part of the subsoil has been mixed with the surface soil by plowing, the surface layer is silty clay loam. In some other small areas, the subsoil is yellowish red.

Included in this unit in mapping are small areas of Tatum, Badin, Secrest, and Cecil soils. Tatum soils are deep over bedrock and are well drained. They are on the more rolling parts of broad slopes. Badin soils are moderately deep over bedrock and are well drained. They are dominantly on narrow ridges. Secrest soils are deep over bedrock and are moderately well drained. They are along intermittent drainageways and in small depressional areas. Cecil soils are very deep over bedrock and are well drained. They are on broad, smooth slopes. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is moderate in the Georgeville soil. Available water capacity also is moderate. Reaction is strongly acid or very strongly acid in the subsoil and underlying material. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is low. The hazard of erosion is moderate in bare or unprotected areas. The depth to bedrock is more than 60 inches.

This map unit is used as cropland, hayland, pasture, or woodland.

This map unit is well suited to cultivated crops. Corn, soybeans, grain sorghum, and small grain are the main crops. The slope and surface runoff are the main limitations affecting crop production. Conservation tillage, crop residue management, and cover crops, such as grasses and legumes, improve tilth and help to control runoff and erosion. Other conservation practices, such as sodded drainageways, diversions, stripcropping, field borders, and crop rotations that include close-growing crops, conserve soil and water.

This map unit is well suited to pasture and hay. Maintaining an adequate plant cover helps to control runoff and erosion. Proper applications of fertilizer and lime and controlled grazing are essential.

This map unit is well suited to woodland. The dominant trees are loblolly pine, shortleaf pine, yellow-poplar, hickory, white oak, southern red oak, and scarlet oak. The main understory plants are dogwood, redbud, sourwood, American holly, eastern redcedar, black cherry, red maple, and sassafras. No significant limitations affect woodland management.

This map unit is well suited to urban development. The moderate permeability, the clayey texture of the subsoil, and low strength are the main limitations affecting most urban uses. The hazard of erosion is moderate on construction sites if the ground cover is removed. This map unit has slight limitations affecting most recreational uses.

The capability subclass is IIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8A.

GfB2—Georgeville silty clay loam, 2 to 8 percent slopes, eroded. This map unit consists mainly of very deep, well drained, gently sloping Georgeville and similar soils on ridges that are dissected by intermittent drainageways. It is in slightly convex areas. Individual areas generally are oblong, vary in width, and range from 4 to more than 80 acres in size. Areas that are less than 20 acres in size are common on the narrower ridges.

Typically, the surface layer is reddish brown silty clay loam 7 inches thick. The subsoil is 53 inches thick. In the upper part, it is red clay. In the next part, it is red silty clay that has strong brown mottles. In the lower part, it is red silty clay loam that has reddish yellow mottles. The underlying material to a depth of 84 inches is weak red silt loam that weathered from saprolite. In some small areas, the surface layer is gravelly silty clay loam. In uneroded areas it is silt loam. In some other small areas, the subsoil is yellowish red.

Included in this unit in mapping are small areas of Tatum, Badin, Secrest, and Cecil soils. Tatum soils are deep over bedrock and are well drained. They are on the more rolling parts of broad slopes. Badin soils are moderately deep over bedrock and are well drained. They are dominantly on narrow slopes. Secrest soils are deep over bedrock and are moderately well drained. They are along intermittent drainageways and in small depressions. Cecil soils are very deep over bedrock and are well drained. They are on broad, smooth slopes. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is moderate in the Georgeville soil. Available water capacity also is moderate. Reaction is strongly acid or very strongly acid in the subsoil and underlying material. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is low. The hazard of further erosion is severe in bare or unprotected areas. The depth to bedrock is more than 60 inches.

This map unit is used as cropland, hayland, pasture, or woodland.

This map unit is moderately suited to cultivated crops. Corn, soybeans, grain sorghum, and small grain are the main crops. The slope, the content of clay in the surface layer, and surface runoff are the main limitations affecting crop production. Because of the relatively high content of clay in the surface layer, this soil is somewhat difficult to till and seed germination is restricted. Tillage is restricted after heavy rains. Conservation tillage, crop residue management, and cover crops, such as grasses and legumes, improve tilth and help to control runoff and erosion. Other conservation practices, such as sodded drainageways, diversions, stripcropping, field borders, and crop rotations that include close-growing crops, conserve soil and water.

This map unit is well suited to pasture and hay. Maintaining an adequate plant cover helps to control runoff and erosion. Proper applications of fertilizer and lime and controlled grazing are essential.

This map unit is well suited to woodland. The dominant trees are loblolly pine, shortleaf pine, yellow-poplar, hickory, white oak, scarlet oak, and southern red oak. The main understory plants are dogwood, redbud, sourwood, American holly, eastern redcedar, black cherry, red maple, and sassafras. The main management concerns are the hazard of erosion, an equipment limitation, and seedling mortality because of the eroded surface layer. Limiting the use of equipment when the soil is wet minimizes compaction and reduces the hazard of erosion. Maintaining a plant cover also helps to control erosion.

This map unit is well suited to urban development. The moderate permeability, the clayey texture of the subsoil, and low strength are the main limitations affecting most urban uses. The hazard of further erosion is severe on construction sites if the ground cover is removed. The slope is the main limitation affecting most recreational uses.

The capability subclass is IIIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 7C.

GoC—Goldston very channery silt loam, 4 to 15 percent slopes. This map unit consists mainly of shallow, well drained to excessively drained, rolling Goldston and similar soils on side slopes, knolls, and narrow ridge crests. The topography is uneven and highly dissected by intermittent drainageways. Individual areas vary in shape and range from 4 to more than 150 acres in size. The short side slopes and knolls range from 4 to more than 25 acres in size. The large dissected ridgetops, which commonly include areas of side slopes, are irregular in shape and in places are more than 150 acres in size.

Typically, the surface layer is brown very channery silt loam 5 inches thick. The subsoil is light yellowish brown very channery silt loam 11 inches thick. Weathered, fractured slate bedrock that has seams of silt loam is at a depth of about 16 inches. Hard, fractured bedrock is at a depth of 27 inches. In some areas bedrock extends to the surface, resulting in narrow, scattered bands of rock outcrop. In other areas flagstones are in and on the surface layer.

Included in this unit in mapping are small areas of Badin, Misenheimer, and Cid soils. Badin soils are moderately deep over bedrock and are well drained. They commonly are in areas of the less dissected topography and on toe slopes. Misenheimer soils are shallow over bedrock and are moderately well drained and somewhat poorly drained. They are at the head of intermittent drainageways and along drainageways. Cid soils are moderately deep over bedrock and are moderately well drained and somewhat poorly drained. They are at the head of intermittent drainageways. Also included are small areas of loamy soils that are moderately deep over bedrock. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is moderately rapid in the Goldston soil. Available water capacity is very low. Reaction ranges from extremely acid to strongly acid in the subsoil and underlying material. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is low. The hazard of erosion is moderate in bare or unprotected areas. Flat slate fragments on the surface create a mulch effect that helps to hold water in the soil and helps to control erosion. The depth to weathered bedrock ranges from 10 to 20 inches. The depth to hard bedrock ranges from 20 to 40 inches.

This map unit is used mainly as woodland. Some areas are used for crops, hay, or pasture.

This map unit is poorly suited to cultivated crops. Corn, soybeans, small grain, and milo are the major crops. The slope, rock fragments in the surface layer, surface runoff, the very low available water capacity, and the hazard of erosion are the main management concerns affecting crop production. Conservation tillage and crop residue management help to control runoff and erosion. Other conservation practices, such as drainageways, field borders, and crop rotations that include close-growing crops, conserve soil and water.

This map unit is moderately suited to pasture and hay. Controlling runoff and erosion helps to maintain an adequate plant cover. Controlled grazing and adequate applications of fertilizer and lime are needed.

This map unit is moderately suited to woodland. The dominant trees are white oak, southern red oak, post

oak, blackjack oak, hickory, shortleaf pine, loblolly pine, and Virginia pine. The main understory trees are eastern redcedar, sweetgum, blackgum, dogwood, and red maple. The main management concern is a hazard of windthrow because of the restricted rooting depth. Planting trees that have a shallow root system and minimizing thinning help to prevent windthrow.

This map unit is poorly suited to urban development. The slope, the depth to bedrock, and the stones on the surface are the main limitations affecting most urban uses. The hazard of erosion is moderate on construction sites if the ground cover is removed. The depth to bedrock and small stones on the surface are the main limitations affecting most recreational uses.

The capability subclass is IVs. Based on loblolly pine as the indicator species, the woodland ordination symbol is 7D.

GoE—Goldston very channery silt loam, 15 to 45 percent slopes. This map unit consists mainly of shallow, well drained to excessively drained, steep Goldston and similar soils on complex side slopes in the uplands. It is along major drainageways and streams. The topography is uneven and highly dissected by intermittent drainageways. Individual areas are irregular in shape and range from 4 to more than 80 acres in size.

Typically, the surface layer is brown very channery silt loam 5 inches thick. The subsoil is light yellowish brown very channery silt loam 11 inches thick. Weathered, fractured slate bedrock that has seams of silt loam is at a depth of about 16 inches. Hard, fractured bedrock is at a depth of 27 inches. In some areas bedrock extends to the surface, resulting in narrow, scattered bands of rock outcrop. In other areas flagstones are in and on the surface layer.

Included in this unit in mapping are small areas of Badin and Misenheimer soils. Badin soils are moderately deep over bedrock and are well drained. They commonly are in areas of the less dissected, less steep topography and on toe slopes. Misenheimer soils are shallow over bedrock and are moderately well drained and somewhat poorly drained. They are at the head of intermittent drainageways and along drainageways. Also included are areas of loamy soils that are moderately deep over bedrock. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is moderately rapid in the Goldston soil. Available water capacity is very low. Reaction ranges from extremely acid to strongly acid. The shrink-swell potential is low. The hazard of erosion is severe in bare or unprotected areas. Flat slate fragments on the surface create a mulch effect that helps to hold water in the soil and helps to control erosion. The depth to weathered bedrock ranges from 10 to 20 inches. The depth to hard bedrock ranges from 20 to 40 inches.

This map unit is used dominantly as woodland. Some areas are used for hay or pasture.

This map unit is not suited to crop production because of the slope.

This map unit is poorly suited to pasture and hay. Plants may suffer from moisture stress during periods of limited rainfall. Controlling runoff and erosion helps to maintain an adequate plant cover. The use of equipment is limited because of the slope. Controlled grazing and adequate applications of fertilizer and lime are needed.

This map unit is poorly suited to woodland. The dominant trees are white oak, post oak, blackjack oak, hickory, shortleaf pine, loblolly pine, and Virginia pine. The main understory trees are eastern redcedar, sweetgum, blackgum, dogwood, and red maple. The main management concerns are the hazard of erosion, seedling mortality, and an equipment limitation because of the slope. Maintaining a plant cover helps to control erosion. Cable yarding is needed. Windthrow is a hazard because the rooting depth is restricted by the bedrock. Planting trees that have a shallow root system and minimizing thinning help to prevent windthrow.

This map unit is not suited to urban development. The slope, the depth to bedrock, and stones are the main limitations affecting most urban uses. The hazard of erosion is very severe on construction sites if the ground cover is removed. The depth to bedrock, the slope, and small stones on the surface are the main limitations affecting most recreational uses.

The capability subclass is VIIs. Based on loblolly pine as the indicator species, the woodland ordination symbol is 7D.

GsB—Goldston-Badin complex, 2 to 8 percent slopes. This map unit consists mainly of shallow and moderately deep, well drained to excessively drained, undulating Goldston and Badin soils on ridges in the uplands. The topography is highly dissected by intermittent drainageways. The unit is about 45 percent Goldston soil and about 40 percent Badin soil. The two soils occur as areas so intricately mixed that mapping them separately is not practical at the selected scale. Individual areas are irregular in shape and range from 5 to more than 100 acres in size.

Typically, the surface layer of the Goldston soil is brown very channery silt loam 5 inches thick. The subsoil is light yellowish brown very channery silt loam 11 inches thick. Weathered, fractured slate bedrock is at a depth of about 16 inches. Hard, fractured bedrock is at a depth of 27 inches. In some places bedrock extends to the surface, resulting in narrow, scattered

bands of rock outcrop. In other areas flagstones are in and on the surface layer.

Permeability is moderately rapid in the Goldston soil. Available water capacity is very low. Reaction ranges from extremely acid to strongly acid in the subsoil and underlying material. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is low. The hazard of erosion is moderate in bare or unprotected areas. Flat slate fragments on the surface create a mulch effect that helps to hold water in the soil and helps to control erosion. The depth to weathered bedrock ranges from 10 to 20 inches. The depth to hard bedrock ranges from 20 to 40 inches.

The Badin soil is well drained. It is moderately deep over bedrock. Typically, the surface layer is brown channery silt loam 7 inches thick. The subsoil is 21 inches thick. In the upper part, it is red silty clay. In the lower part, it is red channery silty clay loam that has yellow and strong brown mottles. Weathered, fractured slate bedrock is at a depth of about 28 inches. Hard, fractured slate bedrock is at a depth of 41 inches. In eroded areas where the upper part of the subsoil has been mixed with the surface soil by plowing, the surface layer is reddish brown channery silty clay loam. In some areas the surface layer is silt loam.

Permeability is moderate in the Badin soil. Available water capacity is low or moderate. Reaction ranges from strongly acid to extremely acid in the subsoil and underlying material. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is moderate. The hazard of erosion is moderate in bare or unprotected areas. Flat slate fragments on the surface create a mulch effect that helps to hold water in the soil and helps to control erosion. The depth to weathered bedrock ranges from 20 to 40 inches. The depth to hard bedrock is more than 40 inches.

Included in this unit in mapping are small areas of Misenheimer and Cid soils. The gently undulating Misenheimer soils are shallow over bedrock and are moderately well drained and somewhat poorly drained. They are at the head of drainageways and on ridges. Cid soils are moderately deep over bedrock and are moderately well drained and somewhat poorly drained. They are at the head of intermittent drainageways. Also included are areas of soils that are moderately deep over bedrock and that have a loamy subsoil. Contrasting inclusions make up about 15 percent of this map unit.

This map unit is used mainly for crops, hay, or pasture. Some areas are wooded.

This map unit is moderately suited to cultivated crops. Corn, soybeans, small grain, and milo are the major crops. The slope, rock fragments in the surface layer, surface runoff, low or very low available water capacity, and the hazard of erosion are the main management concerns affecting crop production. Conservation tillage and crop residue management help to control runoff and erosion. Other conservation practices, such as sodded drainageways, field borders, and crop rotations that include close-growing crops, conserve soil and water.

This map unit is moderately suited to pasture and hay. Controlling runoff and erosion helps to maintain an adequate plant cover. Controlled grazing and adequate applications of fertilizer and lime are needed.

The map unit is moderately suited to woodland. The dominant trees are white oak, southern red oak, chestnut oak, post oak, hickory, shortleaf pine, loblolly pine, and Virginia pine. The main understory plants are eastern redcedar, sweetgum, blackgum, black cherry, red maple, and dogwood. The main management concern is a hazard of windthrow in areas where the rooting depth is restricted by the bedrock. Planting trees that have a shallow root system and minimizing thinning help to prevent windthrow.

This map unit is moderately suited to urban development. The depth to bedrock, stones, the shrink-swell potential, and low strength are the main limitations affecting most urban uses. The hazard of erosion is moderate on construction sites if the ground cover is removed. The depth to bedrock and small stones on the surface are the main limitations affecting most recreational uses.

The capability subclass is IVs in areas of the Goldston soil and IIIe in areas of the Badin soil. Based on loblolly pine as the indicator species, the woodland ordination symbol is 7D in areas of the Goldston soil and 8D in areas of the Badin soil.

GsC—Goldston-Badin complex, 8 to 15 percent slopes. This map unit consists mainly of shallow and moderately deep, well drained to excessively drained, rolling Goldston and Badin soils on side slopes. The topography is highly dissected by intermittent drainageways. The unit is about 55 percent Goldston soil and 30 percent Badin soil. The two soils occur as areas so intricately mixed that mapping them separately is not practical at the selected scale. Individual areas vary in shape and range from 4 to more than 100 acres in size. The short side slopes are oblong and range from 4 to more than 25 acres in size.

The Goldston soil is well drained to excessively drained. It is shallow over bedrock. Typically, the surface layer is brown very channery silt loam 5 inches thick. The subsoil is light yellowish brown very channery silt loam 11 inches thick. Weathered, fractured slate bedrock is at a depth of about 16 inches. Hard,

fractured bedrock is at a depth of 27 inches. In some places bedrock extends to the surface, resulting in narrow, scattered bands of rock outcrop. In some areas flagstones are in and on the surface layer.

Permeability is moderately rapid in the Goldston soil. Available water capacity is very low. Reaction ranges from extremely acid to strongly acid in the subsoil and underlying material. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is low. The hazard of erosion is severe in bare or unprotected areas. Flat slate fragments on the surface create a mulch effect that helps to hold water in the soil and helps to control erosion. The depth to weathered bedrock ranges from 10 to 20 inches. The depth to hard bedrock ranges from 20 to 40 inches.

The Badin soil is well drained and moderately deep over bedrock. Typically, the surface layer is brown channery silt loam 7 inches thick. The subsoil is 21 inches thick. In the upper part, it is red silty clay. In the lower part, it is red channery silty clay loam that has yellow and strong brown mottles. Weathered, fractured slate bedrock is at a depth of about 28 inches. Hard, fractured slate bedrock is at a depth of 41 inches. In eroded areas where the upper part of the subsoil has been mixed with the surface soil by plowing, the surface layer is reddish brown channery silty clay loam. In some areas the surface layer is silt loam.

Permeability is moderate in the Badin soil. Available water capacity is low or moderate. Reaction is very strongly acid or strongly acid in the subsoil and underlying material. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is moderate. The hazard of erosion is severe in bare or unprotected areas. Flat slate fragments on the surface create a mulch effect that helps to hold water in the soil and helps to control erosion. The depth to weathered bedrock ranges from 20 to 40 inches. The depth to hard bedrock is more than 40 inches.

Included in this unit in mapping are small areas of Misenheimer and Cid soils. Misenheimer soils are shallow over bedrock and are moderately well drained and somewhat poorly drained. They are at the head of drainageways and in saddle slope positions. Cid soils are moderately deep over bedrock and are moderately well drained and somewhat poorly drained. They are along intermittent drainageways and at the head of intermittent drainageways. Also included are areas of soils that are moderately deep over bedrock and that have less clay in the subsoil than the Badin soil. Contrasting inclusions make up about 15 percent of this map unit.

This map unit is used mainly as woodland. Some areas are used for crops, hay, or pasture.

This map unit is poorly suited to cultivated crops. Soybeans and small grain are the major crops. The slope, rock fragments in the surface layer, surface runoff, low or very low available water capacity, and the hazard of erosion are the main management concerns affecting crop production. Conservation tillage, stripcropping, and crop residue management help to control runoff and erosion. Other conservation practices, such as sodded drainageways, field borders, and crop rotations that include close-growing crops, conserve soil and water.

This map unit is moderately suited to pasture and hay. Controlling runoff and erosion helps to maintain an adequate plant cover. Controlled grazing and adequate applications of fertilizer and lime are needed.

This map unit is moderately suited to woodland. The dominant trees are white oak, southern red oak, chestnut oak, post oak, hickory, shortleaf pine, loblolly pine, and Virginia pine. The main understory plants are eastern redcedar, sweetgum, blackgum, black cherry, red maple, and dogwood. The main management concern is a hazard of windthrow in areas where the rooting depth is restricted by the bedrock. Planting trees that have a shallow root system and minimizing thinning help to prevent windthrow.

This map unit is poorly suited to urban development. The slope, the depth to bedrock, stones, the shrink-swell potential, and low strength are the main limitations affecting most urban uses. The hazard of erosion is severe on construction sites if the ground cover is removed. The depth to bedrock and small stones on the surface are the main limitations affecting most recreational uses.

The capability subclass is IVs in areas of the Goldston soil and IVe in areas of the Badin soil. Based on loblolly pine as the indicator species, the woodland ordination symbol is 7D in areas of the Goldston soil and 8D in areas of the Badin soil.

GsE—Goldston-Badin complex, 15 to 45 percent slopes. This map unit consists mainly of shallow and moderately deep, well drained to excessively drained, moderately steep and steep Goldston and Badin soils on complex side slopes in the uplands. It is along the major drainageways and streams. The topography is uneven and highly dissected by intermittent drainageways. The unit is about 55 percent Goldston soil and about 30 percent Badin soil. The two soils occur as areas so intricately mixed that mapping them separately is not practical at the selected scale. Individual areas vary in shape and range from about 4 to more than 15 acres in size.

The Goldston soil is well drained to excessively drained. It is shallow over bedrock. Typically, the surface layer is brown very channery silt loam 5 inches

thick. The subsoil is light yellowish brown very channery silt loam 11 inches thick. Weathered, fractured slate bedrock is at a depth of about 16 inches. Hard, fractured bedrock is at a depth of 27 inches. In some places bedrock extends to the surface, resulting in narrow bands of rock outcrop. In other places flagstones are in and on the surface layer.

Permeability is moderately rapid in the Goldston soil. Available water capacity is very low. Reaction ranges from extremely acid to strongly acid. The shrink-swell potential is low. The hazard of erosion is very severe in bare or unprotected areas. Flat slate fragments on the surface create a mulch effect that helps to hold water in the soil and helps to control erosion. The depth to weathered bedrock ranges from 10 to 20 inches. The depth to hard bedrock ranges from 20 to 40 inches.

The Badin soil is moderately deep over bedrock. It is well drained. Typically, the surface layer is brown channery silt loam 7 inches thick. The subsoil is 21 inches thick. In the upper part, it is red silty clay. In the lower part, it is red channery silty clay loam that has yellow and strong brown mottles. Weathered, fractured slate bedrock is at a depth of about 28 inches. Hard, fractured slate bedrock is at a depth of 41 inches. In eroded areas the surface layer is channery silty clay loam. In some other areas, it is silt loam.

Permeability is moderate in the Badin soil. Available water capacity is low or moderate. Reaction ranges from strongly acid to extremely acid. The shrink-swell potential is moderate. The hazard of erosion is very severe in bare or unprotected areas. Flat slate fragments on the surface create a mulch effect that helps to hold water in the soil and helps to control erosion. The depth to weathered bedrock ranges from 20 to 40 inches. The depth to hard bedrock is more than 40 inches.

Included in this unit in mapping are small areas of Misenheimer and Cid soils. Misenheimer soils are shallow over bedrock and are moderately well drained and somewhat poorly drained. They are at the head of drainageways and on toe slopes. Cid soils are moderately deep over bedrock and are moderately well drained and somewhat poorly drained. They are along intermittent drainageways and at the head of intermittent drainageways. Also included are areas of soils that are moderately deep over bedrock and that have less clay in the subsoil than the Badin soil. Contrasting inclusions make up about 15 percent of this map unit.

This map unit is used dominantly as woodland. Some areas are used for hay or pasture.

This map unit is not suited to crop production because of the slope. It is poorly suited to pasture and hay. Plants may suffer from moisture stress during periods of limited rainfall. Controlling runoff and erosion helps to maintain an adequate plant cover. The use of equipment is limited because of the slope. Controlled grazing and adequate applications of fertilizer and lime are needed.

This map unit is moderately suited to woodland. The dominant trees are white oak, chestnut oak, post oak, hickory, shortleaf pine, loblolly pine, and Virginia pine. The main understory plants are eastern redcedar, sweetgum, blackgum, red maple, and dogwood. The main management concerns are the hazard of erosion and an equipment limitation because of the slope. Maintaining a plant cover helps to control erosion. Cable yarding is needed. Windthrow is a hazard in areas where the rooting depth is restricted by the bedrock. Planting trees that have a shallow root system and minimizing thinning help to prevent windthrow.

This map unit is generally not suited to urban development. The slope, the depth to bedrock, and stones are the main limitations affecting most urban uses. The hazard of erosion is very severe on construction sites if the ground cover is removed. The depth to bedrock, the slope, and small stones on the surface are the main limitations affecting most recreational areas.

The capability subclass is VIIs in areas of the Goldston soil and VIIe in areas of the Badin soil. Based on loblolly pine as the indicator species, the woodland ordination symbol is 7D in areas of the Goldston soil and 8R in areas of the Badin soil.

HeB—Helena fine sandy loam, 2 to 8 percent slopes. This map unit consists of very deep, moderately well drained, gently sloping Helena and similar soils on ridges in the uplands, on toe slopes, and at the head of intermittent drainageways. It is in slightly convex to concave areas. Individual areas are generally oblong, vary in width, and range from 4 to more than 50 acres in size.

Typically, the surface layer is grayish brown fine sandy loam 6 inches thick. The subsurface layer is light yellowish brown fine sandy loam 2 inches thick. The subsoil is 37 inches thick. In the upper part, it is yellowish brown clay that has red mottles. In the next part, it is yellowish brown clay that has light gray and red mottles. In the lower part, it is mottled yellowish brown and light gray clay loam. The underlying material to a depth of 72 inches is yellowish brown sandy loam that weathered from saprolite and that has light gray and red mottles. In some areas the surface layer is gravelly. In other areas it is as much as 12 inches thick and is loamy sand. In some small areas, the slope is less than 2 percent.

Included in this unit in mapping are small areas of Appling and Colfax soils. Appling soils are very deep over bedrock and are well drained. They are at the higher elevations. Colfax soils are very deep over bedrock and are somewhat poorly drained. They are at the head of drainageways and in depressions. Also included are small areas of poorly drained soils in depressions and areas of soils that are well drained and have a subsoil of very firm clay. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is slow in the Helena soil. Available water capacity is moderate. Reaction ranges from extremely acid to strongly acid in the subsoil and underlying material. It varies widely in the surface layer and subsurface layer as a result of local liming practices. The shrink-swell potential is high. A seasonal high water table is perched between depths of 1.5 and 2.5 feet from January through April. The depth to bedrock is more than 5 feet.

This map unit is used mainly as cropland or pasture. Some areas are wooded or used for urban development.

This map unit is moderately suited to corn, soybeans, small grain, and milo. The wetness and the slow permeability are the main limitations affecting crop production. In depressional areas and in areas where the slope is less than 2 percent, a drainage system may be needed to remove surface and subsurface water. Grassed waterways can maintain open drainage channels and remove surface water. Other applicable conservation practices are conservation tillage, crop residue management, diversions, field borders, and crop rotations.

This map unit is well suited to hay and pasture. The wetness and the slow permeability are the main limitations. Controlled grazing and applications of fertilizer are needed.

This map unit is well suited to woodland. The dominant trees are white oak, willow oak, yellow-poplar, hickory, southern red oak, loblolly pine, shortleaf pine, and Virginia pine. The main understory plants are dogwood, sweetgum, blackgum, sourwood, holly, and black cherry. The main limitation is the seasonal high water table, which restricts the use of equipment to dry periods.

This map unit is poorly suited to urban development. The wetness, the slow permeability, the shrink-swell potential, and low strength are the main limitations affecting most urban uses. The hazard of erosion is moderate on construction sites if the ground cover is removed. The wetness and the slow permeability are the main limitations affecting recreational uses.

The capability subclass is IIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8A.

IrA—Iredell loam, 0 to 3 percent slopes. This map unit consists mainly of very deep, moderately well drained and somewhat poorly drained, nearly level and gently sloping Iredell and similar soils on broad flats in the uplands, in depressions, and at the head of intermittent drainageways. The slopes are slightly concave. Individual areas are irregular in shape and range from 4 to more than 100 acres in size.

Typically, the surface layer is dark grayish brown loam 8 inches thick. The subsoil is 26 inches thick. In the upper part, it is light olive brown clay. In the lower part, it is mottled olive brown and dark grayish brown clay loam. The underlying material to a depth of 60 inches is multicolored sandy clay loam that weathered from saprolite. In some areas the surface layer is sandy loam. In other small areas, it is gravelly loam. In places the slope is more than 3 percent.

Included in this unit in mapping are small areas of Mecklenburg and Zion soils. Mecklenburg soils are very deep over bedrock and are well drained. They are at the higher elevations. Zion soils are moderately deep over bedrock and are well drained. They are in small areas that have a slope of more than 2 percent. Also included are small areas of poorly drained soils in depressions and areas of soils that have bedrock at a depth of less than 40 inches. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is slow in the Iredell soil. Available water capacity is low or moderate. Reaction ranges from moderately acid to mildly alkaline in the subsoil and underlying material. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is very high. A seasonal high water table is perched between depths of 1.0 foot and 2.0 feet from December through April. The depth to bedrock is more than 60 inches.

This map unit is used mainly as cropland or pasture. Small areas are wooded.

This map unit is moderately suited to corn, soybeans, and milo. The wetness and the slow permeability are the main limitations affecting crop production. In years of above average rainfall, crops may drown. Drainage ditches may be needed to remove surface water. Grassed waterways can maintain open drainage channels and remove surface water. Tillage is restricted after heavy rains because of the slow permeability. Other applicable conservation practices are conservation tillage, crop residue management, field borders, and crop rotations.

This map unit is well suited to hay and pasture. The wetness and the slow permeability are the main

limitations. Controlled grazing and applications of fertilizer are needed. A surface drainage system may be needed in depressions.

This map unit is moderately suited to woodland. The dominant trees are loblolly pine, shortleaf pine, white oak, post oak, and eastern redcedar. The main understory trees and shrubs are dogwood, sourwood, holly, black cherry, and red maple. The main management concerns are an equipment limitation and seedling mortality because of the wetness and the heavy, plastic clay in the subsoil. The use of equipment should be limited when the soil is wet. Reforestation activities should be restricted to periods after the water table has dropped.

This map unit is poorly suited to urban development. The wetness, the slow permeability, the very high shrink-swell potential, the plastic clayey texture of the subsoil, and low strength are the main limitations affecting most urban uses. The wetness is the main limitation affecting recreational uses.

The capability subclass is IIw. Based on loblolly pine as the indicator species, the woodland ordination symbol is 6C.

MeB2—Mecklenburg sandy clay loam, 2 to 8 percent slopes, eroded. This map unit consists mainly of very deep, well drained, gently sloping Mecklenburg and similar soils on ridges and side slopes that are dissected by intermittent drainageways in the uplands. It is in slightly convex areas. Individual areas generally are oblong, vary in width, and range from 4 to more than 40 acres in size.

Typically, the surface layer is reddish brown sandy clay loam 6 inches thick. The subsoil is 34 inches thick. In the upper part, it is red clay. In the next part, it is yellowish red clay that has red and strong brown mottles. In the lower part, it is red clay loam that has yellowish brown mottles. The underlying material to a depth of 60 inches is multicolored silty clay loam that weathered from saprolite. In some uneroded areas, the surface layer is loam. In other areas it is gravelly sandy clay loam.

Included in this unit in mapping are small areas of Cecil, Gaston, Zion, and Iredell soils. Cecil soils are very deep over bedrock and are well drained. They commonly are in large mapped areas that have a smooth surface. Gaston soils are very deep over bedrock and are well drained. These included Gaston soils are in areas adjacent to map units named as Gaston soils. Zion soils are moderately deep over bedrock and are well drained. They are in small undulating areas. Iredell soils are deep over bedrock and are moderately well drained and somewhat poorly drained. They are in depressions and along drainageways. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is slow in the Mecklenburg soil. Available water capacity is low or moderate. Reaction ranges from moderately acid to neutral in the subsoil and underlying material. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is moderate. The hazard of further erosion is moderate in bare or unprotected areas. The depth to bedrock is more than 5 feet.

This map unit is used as cropland, hayland, pasture, or woodland.

This map unit is moderately suited to cultivated crops. Corn, soybeans, grain sorghum, and small grain are the main crops. The slope, the content of clay in the surface layer, the slow permeability, and surface runoff are the main limitations affecting crop production. Because of the content of clay in the surface layer, this soil is somewhat difficult to till and seed germination is restricted. Tillage is restricted after heavy rains. Conservation tillage, crop residue management, and cover crops, such as grasses and legumes, improve tilth and help to control runoff and erosion. Other conservation practices, such as sodded drainageways, diversions, stripcropping, field borders, and crop rotations that include close-growing crops, conserve soil and water.

This map unit is well suited to pasture and hay. Maintaining an adequate plant cover helps to control runoff and erosion. Proper applications of fertilizer and lime and controlled grazing are needed.

This map unit is moderately suited to woodland. The dominant trees are loblolly pine, shortleaf pine, Virginia pine, eastern redcedar, hickory, northern red oak, white oak, and sweetgum. The main understory trees and shrubs are redbud, dogwood, sourwood, holly, black cherry, red maple, and sassafras. The main management concerns are the hazard of erosion, an equipment limitation, and seedling mortality because of the eroded surface layer. Limiting the use of equipment when the soil is wet minimizes compaction and reduces the hazard of erosion. Maintaining a plant cover also helps to control erosion.

This map unit is moderately suited to urban development. The slow permeability, the moderate shrink-swell potential, the clayey texture of the subsoil, and low strength are the main limitations affecting most urban uses. The hazard of erosion is moderate on construction sites if the ground cover is removed. The slow permeability is the main limitation affecting most recreational uses.

The capability subclass is IIIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 6C.

MhA—Misenheimer-Cid complex, 0 to 3 percent slopes. This map unit consists mainly of shallow and moderately deep, moderately well drained and somewhat poorly drained, nearly level and gently sloping Misenheimer and Cid soils on broad flats and ridges in the uplands, in depressions, and at the head of intermittent drainageways. It is about 60 percent Misenheimer soil and 25 percent Cid soil. The two soils occur as areas so intricately mixed that mapping them separately is not practical at the selected scale. Individual areas are irregular in shape and range from 4 to more than 30 acres in size.

The Misenheimer soil is shallow over bedrock. It is moderately well drained and somewhat poorly drained. Typically, the surface layer is grayish brown channery silt loam 6 inches thick. The subsoil is 12 inches of pale yellow channery silt loam that has gray mottles. Weathered, fractured slate bedrock is at a depth of about 18 inches. Hard, fractured slate bedrock is at a depth of 24 inches. In some areas the surface layer is very channery silt loam.

Permeability is moderately rapid in the Misenheimer soil. Available water capacity is very low. Reaction ranges from strongly acid to extremely acid in the subsoil. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is low. A seasonal high water table is perched between depths of 1.0 foot and 1.5 feet from December through April. The depth to weathered bedrock ranges from 10 to 20 inches. The depth to hard bedrock ranges from 20 to 40 inches.

The Cid soil is moderately deep over bedrock. It is moderately well drained and somewhat poorly drained. Typically, the surface layer is light brownish gray channery silt loam 4 inches thick. The subsurface layer is pale yellow silt loam 5 inches thick. The subsoil is 18 inches thick. In the upper part, it is brownish yellow silty clay loam that has pale yellow mottles. In the next part, it is light olive brown silty clay that has light brownish gray mottles. In the lower part, it is mottled grayish brown and light olive brown channery silty clay. Weathered, fractured slate bedrock is at a depth of about 27 inches. Hard, fractured slate bedrock is at a depth of about 32 inches. In some small areas, the surface layer is silt loam.

Permeability is slow in the Cid soil. Available water capacity is low or moderate. Reaction ranges from strongly acid to extremely acid in the subsoil and underlying material. It varies widely in the surface layer and subsurface layer as a result of local liming practices. The shrink-swell potential is moderate. A seasonal high water table fluctuates between depths of 1.5 and 2.5 feet from December through May. The depth to hard, fractured bedrock ranges from 20 to 40 inches.

Included in this unit in mapping are small areas of Goldston and Badin soils. Goldston soils are shallow over bedrock and are well drained to excessively drained. They are on small knolls and narrow ridges. Badin soils are moderately deep over bedrock and are well drained. They are on small knolls and ridges. Also included are areas of soils that are moderately deep over bedrock and that have less clay in the subsoil than the Misenheimer and Cid soils. Contrasting inclusions make up about 15 percent of this map unit.

This map unit is used mainly as cropland, pasture, or woodland.

This map unit is poorly suited to corn, soybeans, small grain, and milo. The wetness, the slow permeability in the Cid soil, and the limited available water capacity are the main limitations affecting crop production. In years of above average rainfall, crops may drown. A drainage system may be needed to remove surface and subsurface water. Grassed waterways can maintain open drainage channels and remove surface water. Other applicable conservation practices are conservation tillage, crop residue management, diversions, field borders, and crop rotations.

This map unit is moderately suited to hay and pasture. The wetness and the slow permeability in the Cid soil are the main limitations. Controlled grazing and applications of fertilizer are needed.

This map unit is moderately suited to woodland. The dominant trees are white oak, post oak, blackjack oak, willow oak, hickory, sweetgum, Virginia pine, loblolly pine, and shortleaf pine. The main understory plants are eastern redcedar, blackgum, red maple, and dogwood. Because the rooting depth is restricted by the bedrock, trees commonly are subject to windthrow during wet, windy periods. Planting trees that have a shallow root system and minimizing thinning help to prevent windthrow. The seedling mortality rate is moderate because of the wetness. Seedlings should be planted after the water table has dropped.

This map unit is poorly suited to urban development. The wetness, the depth to bedrock, the slow permeability and moderate shrink-swell potential in the Cid soil, and low strength are the main limitations affecting most urban uses. There is a slight hazard of erosion on construction sites if the ground cover is removed. The wetness and the depth to bedrock are the main limitations affecting recreational uses.

The capability subclass is IIIw in areas of the Misenheimer soil and IIw in areas of the Cid soil. Based on shortleaf pine as the indicator species, the woodland

ordination symbol is 6D in areas of the Misenheimer soil and 6W in areas of the Cid soil.

PaE2—Pacolet sandy clay loam, 15 to 40 percent slopes, eroded. This map unit consists mainly of very deep, well drained, moderately steep and steep Pacolet and similar soils on convex side slopes in the uplands. It is along the major drainageways and streams. The topography is highly dissected by intermittent drainageways. Individual areas are irregular in shape and range from 4 to more than 75 acres in size.

Typically, the surface layer is yellowish red sandy clay loam 5 inches thick. The subsoil is 30 inches thick. In the upper part, it is red clay. In the lower part, it is red sandy clay loam that has reddish yellow mottles. The underlying material to a depth of 60 inches is red, yellow, and brown loam that weathered from saprolite. In some small uneroded areas, the surface layer is sandy loam. In other small areas, it is gravelly sandy clay loam. In some severely eroded areas, it is clay loam. In places the slope is less than 15 percent.

Included in this unit in mapping are small areas of Cecil and Chewacla soils. Cecil soils are very deep over bedrock and are well drained. They commonly are on the less steep side slopes and on toe slopes. Chewacla soils are very deep over bedrock and are somewhat poorly drained. They are on very narrow flood plains between ridges of the Pacolet soil. Also included are areas of soils that are moderately deep over bedrock and that contain less clay in the subsoil than the Pacolet soil. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is moderate in the Pacolet soil. Available water capacity is low. Reaction is very strongly acid to moderately acid in the subsoil and underlying material. It varies widely in the surface layer. The shrink-swell potential is low. The hazard of further erosion is very severe in bare or unprotected areas. The depth to bedrock is more than 60 inches.

This map unit is used dominantly as woodland. Some areas are used as pasture.

This map unit is not generally suited to crop production because of the slope.

This map unit is moderately suited to pasture. Controlling runoff and erosion helps to maintain an adequate plant cover. Controlled grazing and adequate applications of fertilizer and lime are needed. An equipment limitation is the main management concern.

This map unit is poorly suited to woodland. The dominant trees are loblolly pine, shortleaf pine, Virginia pine, yellow-poplar, hickory, white oak, and post oak. The understory includes flowering dogwood, sourwood, American holly, eastern redcedar, black cherry, red maple, redbud, and sassafras. The main management concerns are the hazard of erosion, an equipment limitation, seedling mortality, and the eroded surface layer. Maintaining a plant cover helps to control further erosion. Cable yarding is needed because of the slope. Seedlings should be planted when soil moisture is at the optimum level.

This map unit is generally not suited to urban development. The slope and the moderate permeability are the main limitations affecting most urban uses. The hazard of erosion is very severe on construction sites if the ground cover is removed. The slope is the main limitation affecting most recreational uses.

The capability subclass is VIIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 6C.

PgC—Pacolet-Gullied land complex, 4 to 15 percent slopes. This map unit occurs mainly as areas of a very deep, well drained, gently sloping to strongly sloping Pacolet soil and U-shaped areas of Gullied land on ridges in the uplands. It is about 60 percent eroded Pacolet soil and 25 percent Gullied land. The Pacolet soil and Gullied land occur as areas so intricately mixed that mapping them separately is not practical at the selected scale. Individual areas are irregular in shape and range from 15 to 300 acres in size.

Typically, the surface layer of the Pacolet soil is yellowish brown clay loam 4 inches thick. The subsoil is 34 inches thick. In the upper part, it is red clay. In the lower part, it is mottled red and strong brown sandy clay loam. The underlying material to a depth of 60 inches is multicolored sandy loam that weathered from saprolite. In some areas the upper part of the subsoil has been removed by sheet erosion. In some less eroded areas, the surface layer is sandy loam or sandy clay loam. In other areas the subsoil is strong brown or yellowish red. In places the subsoil has less clay. In other places the slope is more than 15 percent.

Permeability is moderate in the Pacolet soil. Available water capacity is low. Reaction ranges from very strongly acid to moderately acid in the subsoil and underlying material. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is low. The hazard of erosion is very severe in bare or unprotected areas. The depth to bedrock is more than 60 inches.

The Gullied land consists of gullies, areas severely damaged by sheet erosion, and remnants of severely eroded, well drained Pacolet soils between closely spaced gullies. The gullies are 3 to 20 feet deep over bedrock, 4 to 50 feet wide, and 50 to more than 350 feet in length. They are 2 to more than 300 feet apart. Most of the gullies run directly downslope, but a few meander along old roadbeds and other breaks in the

landscape. The texture varies, but includes sandy loam, loam, sandy clay loam, clay loam, and clay. Some gullies are stabilized with vegetation, including trees. Erosion is still active in the upper part, or head, of the larger gullies. In these areas the headwalls are nearly vertical. In the less sloping parts of these areas, the pattern of previous sheet erosion is distinctive. In many areas downslope from the gullies, 1 or 2 feet of sediment has accumulated.

Included in this unit in mapping are a few small areas of the well drained Cecil and Appling soils, which are very deep over bedrock. These soils generally are in the less sloping areas. Contrasting inclusions make up about 15 percent of this map unit.

Most of this map unit is used as woodland. A few small areas are used as pasture.

This map unit is poorly suited to cropland and pasture. The areas between the gullies are too small to manage, and the gullies are too large for regrading and planting to be economically practical. The slope is a limitation.

This map unit is poorly suited to woodland. The dominant trees are loblolly pine, shortleaf pine, Virginia pine, yellow-poplar, hickory, white oak, northern red oak, and post oak. The main understory trees are dogwood, sourwood, American holly, eastern redcedar, black cherry, red maple, redbud, and sassafras. The main management concerns are the hazard of erosion, an equipment limitation, and seedling mortality. Limiting the use of equipment when the soil is wet minimizes compaction and reduces the hazard of erosion. Maintaining a plant cover also helps to control further erosion. Replanting is needed immediately after harvesting.

This map unit is generally not suited to urban development. The slope, the moderate permeability, the clayey texture of the subsoil, low strength, and the instability of the gullied areas are the main limitations affecting urban uses. The hazard of erosion is very severe on construction sites if the ground cover is removed. The slope and the gullies are the main limitations affecting most recreational uses.

The capability subclass is VIe in areas of the Pacolet soil and VIIe in areas of the Gullied land. Based on loblolly pine as the indicator species, the woodland ordination symbol is 6C in areas of the Pacolet soil. The Gullied land has not been assigned a woodland ordination symbol.

ScA—Secrest-Cid complex, 0 to 3 percent slopes. This complex consists mainly of deep and moderately deep, moderately well drained and somewhat poorly drained, nearly level and gently sloping Secrest and Cid soils on flats, on ridges in the uplands, in depressions, and at the head of intermittent drainageways. It is about 65 percent Secrest soil and 20 percent Cid soil. The two soils occur as areas so intricately mixed that mapping them separately is not practical at the selected scale. Individual areas are irregular in shape and range from 4 to more than 50 acres in size.

The Secrest soil is deep over bedrock. It is moderately well drained. Typically, the surface layer is pale brown silt loam 8 inches thick. The subsoil is 46 inches thick. In sequence downward, it is olive yellow silt loam; brownish yellow silty clay loam; brownish yellow silty clay loam that has light brownish gray and yellow mottles; and mottled brownish yellow and light brownish gray silty clay. Weathered, fractured slate bedrock is at a depth of about 54 inches. Hard, fractured slate bedrock is at a depth of 62 inches.

Permeability is slow in the Secrest soil. Available water capacity is moderate. Reaction is very strongly acid to moderately acid in the subsoil. It varies widely in the surface layer and subsurface layer as a result of local liming practices. The shrink-swell potential is low. A seasonal high water table fluctuates between depths of 1.5 and 2.5 feet from December through March. The depth to weathered bedrock ranges from 40 to 60 inches. The depth to hard bedrock is more than 60 inches.

The Cid soil is moderately deep over bedrock. It is moderately well drained and somewhat poorly drained. Typically, the surface layer is light brownish gray channery silt loam 4 inches thick. The subsurface layer is pale yellow channery silt loam 5 inches thick. The subsoil is 18 inches thick. In the upper part, it is brownish yellow silty clay loam that has pale yellow mottles. In the next part, it is light olive brown silty clay that has light brownish gray mottles. In the lower part, it is mottled grayish brown and light olive brown channery silty clay. Weathered, fractured slate bedrock is at a depth of about 27 inches. Hard, fractured slate bedrock is at a depth of about 32 inches. In some small areas, the surface layer is silt loam.

Permeability is slow in the Cid soil. Available water capacity is low or moderate. Reaction ranges from strongly acid to extremely acid in the subsoil and underlying material. It varies widely in the surface layer and subsurface layer as a result of local liming practices. The shrink-swell potential is moderate. A seasonal high water table fluctuates between depths of 1.5 and 2.5 feet from December through May. The depth to hard bedrock ranges from 20 to 40 inches.

Included in these soils in mapping are small areas of Misenheimer and Badin soils. Misenheimer soils are shallow over bedrock and are moderately well drained. They are in slightly elevated areas where bedrock extends to or near the surface. Badin soils are

Figure 6.—Fescue hay in an area of Secrest-Cid complex, 0 to 3 percent slopes.

moderately deep over bedrock and are well drained. They are on small knolls and ridges. Also included are areas of soils that are deep over bedrock and that have more clay in the subsoil than the Secrest and Cid soils and areas of soils that are moderately deep over bedrock and that have less clay in the subsoil than the Secrest and Cid soils. Contrasting inclusions make up about 15 percent of this map unit.

This map unit is used mainly as cropland, pasture, or woodland.

This map unit is well suited to corn, soybeans, small grain, and milo. The wetness and the slow permeability are the main limitations affecting crop production. In years of low rainfall, these soils are among the most productive soils in the county. In years of above average rainfall, crops may drown. A drainage system may be needed to remove surface and subsurface water. Grassed waterways can maintain open drainage channels and remove surface water. Other applicable conservation practices are conservation tillage, crop residue management, diversions, field borders, and crop rotations.

This map unit is well suited to hay and pasture (fig. 6). The wetness and the slow permeability are the main limitations. Controlled grazing and applications of fertilizer are needed.

This map unit is well suited to woodland. The dominant trees are white oak, southern red oak, willow oak, blackjack oak, post oak, loblolly pine, shortleaf pine, Virginia pine, and yellow-poplar. The main understory plants are blackgum, sweetgum, eastern redcedar, and red maple. The main limitation is the seasonal high water table, which restricts the use of equipment to dry periods.

This map unit is poorly suited to urban development. The wetness, the depth to bedrock, the slow permeability, the shrink-swell potential, and low strength are the main limitations affecting most urban uses. There is a slight hazard of erosion on construction sites if the ground cover is removed. The wetness and the slow permeability are the main limitations affecting recreational uses.

The capability subclass is IIw. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8W in areas of the Secrest soil. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 6W in areas of the Cid soil.

TaB—Tatum gravelly silt loam, 2 to 8 percent slopes. This map unit consists mainly of deep, well drained, gently sloping Tatum and similar soils on ridges that are dissected by intermittent drainageways. It is in slightly convex areas. Individual areas generally are oblong, vary in width, and range from 4 to more than 50 acres in size.

Typically, the surface layer is yellowish brown gravelly silt loam 7 inches thick. The subsoil is 35 inches thick. In the upper part, it is red silty clay loam. In the next part, it is red silty clay. In the lower part, it is red silty clay loam. The underlying material extends to a depth of 53 inches. It is multicolored silt loam that weathered from saprolite. Weathered, fractured slate bedrock is at a depth of 53 inches. In some small areas, the surface layer is silt loam. In some eroded areas where the upper part of the subsoil has been mixed with the surface soil by plowing, the surface layer is gravelly silty clay loam. In some small areas, the subsoil is yellowish red.

Included in this unit in mapping are small areas of Georgeville, Badin, Secrest, and Cecil soils. Georgeville and Cecil soils are very deep over bedrock and are well drained. They are on the broad, smooth slopes. Badin soils are moderately deep over bedrock and are well drained. They are dominantly on narrow ridges and in undulating areas. Secrest soils are deep over bedrock and are moderately well drained. They are along intermittent drainageways and in small depressional areas. Also included are some areas that have slopes of more than 8 percent. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is moderate in the Tatum soil. Available water capacity also is moderate. Reaction is strongly acid or very strongly acid in the subsoil and underlying material. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is moderate. The hazard of erosion is moderate in bare or unprotected areas. The depth to weathered bedrock ranges from 40 to 60 inches. The depth to hard bedrock is more than 60 inches.

This map unit is used as cropland, hayland, pasture, or woodland.

This map unit is well suited to cultivated crops (fig. 7). Corn, soybeans, grain sorghum, and small grain are the main crops. The slope and surface runoff are the main limitations affecting crop production. Conservation tillage, crop residue management, and cover crops, such as grasses and legumes, improve tilth and help to control runoff and erosion. Other conservation practices, such as sodded drainageways, diversions, stripcropping, field borders, and crop rotations that include close-growing crops, conserve soil and water.

This map unit is well suited to pasture and hay. Maintaining an adequate plant cover helps to control runoff and erosion. Proper applications of fertilizer and lime and controlled grazing are needed.

This map unit is well suited to woodland. The dominant trees are loblolly pine, shortleaf pine, Virginia pine, yellow-poplar, hickory, white oak, and northern red oak. The main understory plants are dogwood, blackgum, sourwood, redbud, American holly, eastern redcedar, black cherry, red maple, and sassafras. No significant limitations affect woodland management.

This map unit is moderately suited to urban development. The moderate permeability, the clayey texture of the subsoil, the moderate shrink-swell potential, and low strength are the main limitations affecting most urban uses. The hazard of erosion is moderate on construction sites if the ground cover is removed. Small stones on the surface limit most recreational uses.

The capability subclass is IIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8A.

TaC—Tatum gravelly silt loam, 8 to 15 percent slopes. This map unit consists mainly of deep, well drained Tatum and similar soils on complex side slopes that are dissected by intermittent drainageways in the uplands. It is in slightly convex areas. Individual areas generally are long, vary in width, and range from 4 to more than 25 acres in size.

Typically, the surface layer is yellowish brown gravelly silt loam 7 inches thick. The subsoil is 35 inches thick. In the upper part, it is red silty clay loam. In the next part, it is red silty clay. In the lower part, it is red silty clay loam. The underlying material extends to a depth of 53 inches. It is multicolored silt loam that weathered from saprolite. Weathered, fractured slate bedrock is at a depth of 53 inches. In some small areas, the surface layer is silt loam. In some eroded

Figure 7.—A well managed stand of sudex in an area of Tatum gravelly silt loam, 2 to 8 percent slopes.

areas where the upper part of the subsoil has been mixed with the surface soil by plowing, the surface layer is gravelly silty clay loam. In some small areas, the subsoil is yellowish red.

Included in this unit in mapping are small areas of Georgeville, Badin, and Secrest soils. Georgeville soils are very deep over bedrock and are well drained. They are in the broader and less sloping areas. Badin soils are moderately deep over bedrock and are well drained. They are dominantly on the more dissected, narrow slopes. Secrest soils are deep over bedrock and are moderately well drained. They are along intermittent drainageways and in small depressional areas. Also included are some areas that have slopes of less than 8 percent. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is moderate in the Tatum soil. Available water capacity also is moderate. Reaction is strongly acid or very strongly acid in the subsoil and underlying material. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is moderate. The hazard of erosion is severe in bare or

unprotected areas. The depth to weathered bedrock ranges from 40 to 60 inches. The depth to hard bedrock is more than 60 inches.

This map unit is used as woodland, cropland, hayland, or pasture.

This map unit is moderately suited to cultivated crops. Soybeans, grain sorghum, and small grain are the main crops. The slope, the hazard of erosion, and surface runoff are the main limitations affecting crop production. Conservation tillage, crop residue management, and cover crops, such as grasses and legumes, improve tilth and help to control runoff and erosion. Other conservation practices, such as sodded drainageways, diversions, stripcropping, field borders, and crop rotations that include close-growing crops, conserve soil and water.

This map unit is well suited to pasture and hay. Maintaining an adequate plant cover helps to control runoff and erosion. Proper applications of fertilizer and lime and controlled grazing are needed.

This map unit is well suited to woodland. The dominant trees are loblolly pine, shortleaf pine, Virginia pine, yellow-poplar, hickory, white oak, and northern red oak. The main understory plants are dogwood, sourwood, American holly, eastern redcedar, redbud, black cherry, red maple, and sassafras. No significant limitations affect woodland management.

This map unit is poorly suited to urban development. The moderate permeability, the clayey texture of the subsoil, the slope, the moderate shrink-swell potential, and low strength are the main limitations affecting most urban uses. The hazard of erosion is severe on construction sites if the ground cover is removed. Small stones on the surface and the slope are the main limitations affecting most recreational uses.

The capability subclass is IIIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8A.

TaD—Tatum gravelly silt loam, 15 to 35 percent slopes. This map unit consists mainly of deep, well drained, steep Tatum and similar soils on convex side slopes in the uplands. It is along the major drainageways and streams. The topography is highly dissected by intermittent drainageways. Individual areas are long, vary in width, and range from 4 to more than 50 acres in size.

Typically, the surface layer is yellowish brown gravelly silt loam 7 inches thick. The subsoil is 35 inches thick. In the upper part, it is red silty clay loam. In the next part, it is red silty clay. In the lower part, it is red silty clay loam. The underlying material extends to a depth of 53 inches. It is multicolored silt loam that weathered from saprolite. Weathered, fractured slate bedrock is at a depth of 53 inches. In some small areas, the surface layer is silt loam. In some eroded areas, it is gravelly silty clay loam. In other small areas, the subsoil is yellowish red.

Included in this unit in mapping are small areas of Badin and Secrest soils. Badin soils are moderately deep over bedrock and are well drained. They are dominantly on the more dissected, narrow slopes. Secrest soils are deep over bedrock and are moderately well drained. They are along intermittent drainageways and in small depressional areas. Also included are some areas that have slopes of less than 15 percent. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is moderate in the Tatum soil. Available water capacity also is moderate. Reaction is strongly acid or very strongly acid in the subsoil and underlying material. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is moderate. The hazard of erosion is severe in bare or unprotected areas. The depth to weathered bedrock ranges from 40 to 60 inches. The depth to hard bedrock is more than 60 inches.

This map unit is used dominantly as woodland. Some areas are used as pasture.

This map unit is not suited to crop production because of the slope.

This map unit is moderately suited to pasture. Controlling runoff and erosion helps to maintain an adequate plant cover. Controlled grazing and adequate applications of fertilizer and lime are needed.

This map unit is moderately suited to woodland. The dominant trees are loblolly pine, shortleaf pine, Virginia pine, hickory, white oak, northern red oak, and yellow-poplar. The main understory plants are dogwood, sourwood, holly, eastern redcedar, black cherry, red maple, and sassafras. The main management concerns are the hazard of erosion, an equipment limitation, and seedling mortality. Maintaining a plant cover helps to control erosion. Cable yarding is a needed because of the slope. Seedlings should be planted when soil moisture is at the optimum level.

This map unit is poorly suited to urban development. The slope, the clayey texture of the subsoil, and low strength are the main limitations affecting most urban uses. The hazard of erosion is very severe on construction sites if the ground cover is removed. The slope and small stones on the surface are the main limitations affecting most recreational uses.

The capability subclass is VIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 6R.

TbB2—Tatum gravelly silty clay loam, 2 to 8 percent slopes, eroded. This map unit consists mainly of deep, well drained, gently sloping Tatum and similar soils on ridges that are dissected by intermittent drainageways. It is in slightly convex areas. Individual areas generally are oblong, vary in width, and range from 4 to more than 100 acres in size.

Typically, the surface layer is yellowish red gravelly silty clay loam 6 inches thick. The subsoil is 39 inches thick. In the upper part, it is red silty clay. In the next part, it is red silty clay that has strong brown mottles. In the lower part, it is mottled red, strong brown, and yellow silty clay loam. The underlying material extends to a depth of 54 inches. It is multicolored silt loam that weathered from saprolite. Weathered, fractured slate bedrock is at a depth of 54 inches. In some small areas, the surface layer is silty clay loam. In some uneroded areas, it is gravelly silt loam. In other small areas, the subsoil is yellowish red.

Included in this unit in mapping are small areas of Georgeville, Badin, Secrest, and Cecil soils. Georgeville and Cecil soils are very deep over bedrock and are well drained. They are on broad, smooth slopes. Badin soils are moderately deep over bedrock and are well drained. They are dominantly on narrow slopes and in undulating areas. Secrest soils are deep over bedrock and are moderately well drained. They are along intermittent drainageways and in small depressions. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is moderate in the Tatum soil. Available water capacity also is moderate. Reaction is strongly acid or very strongly acid in the subsoil and underlying material. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is moderate. The hazard of further erosion is moderate in bare or unprotected areas. The depth to weathered bedrock ranges from 40 to 60 inches. The depth to hard bedrock is more than 60 inches.

This map unit is used as cropland, hayland, pasture, or woodland.

This map unit is moderately suited to cultivated crops. Corn, soybeans, grain sorghum, and small grain are the main crops. The slope, the content of clay in the surface layer, and surface runoff are the main limitations affecting crop production. Because of the relatively high content of clay in the surface layer, this soil is somewhat difficult to till and seed germination is restricted. Tillage is restricted after heavy rains. Conservation tillage, crop residue management, and cover crops, such as grasses and legumes, improve tilth and help to control runoff and erosion. Other conservation practices, such as sodded drainageways, diversions, stripcropping, field borders, and crop rotations that include close-growing crops, conserve soil and water.

This map unit is well suited to pasture and hay. Maintaining an adequate plant cover helps to control runoff and erosion. Proper applications of fertilizer and lime and controlled grazing are needed.

This map unit is well suited to woodland. The dominant trees are loblolly pine, shortleaf pine, Virginia pine, yellow-poplar, hickory, white oak, and northern red oak. The main understory trees and shrubs are dogwood, sourwood, holly, eastern redcedar, redbud, black cherry, red maple, and sassafras. The main management concerns are the hazard of erosion, an equipment limitation, and seedling mortality. Limiting the use of equipment when the soil is wet minimizes compaction and reduces the hazard of erosion. Maintaining a plant cover also helps to control erosion.

This map unit is moderately suited to urban development. The moderate permeability, the clayey texture of the subsoil, the moderate shrink-swell potential, and low strength are the main limitations affecting most urban uses. Erosion is a hazard on construction sites if the ground cover is removed. Small stones on the surface limit most recreational uses.

The capability subclass is IIIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8A.

TbC2—Tatum gravelly silty clay loam, 8 to 15 percent slopes, eroded. This map unit consists mainly of deep, well drained, strongly sloping Tatum and similar soils on complex side slopes that are dissected by intermittent drainageways. It is in convex areas. Individual areas generally are long, vary in width, and range from 4 to more than 100 acres in size.

Typically, the surface layer is yellowish red gravelly silty clay loam 6 inches thick. The subsoil is 39 inches thick. In the upper part, it is red silty clay. In the next part, it is red silty clay that has strong brown mottles. In the lower part, it is mottled red, strong brown, and yellow silty clay loam. The underlying material extends to a depth of 54 inches. It is multicolored silt loam that weathered from saprolite. Weathered, fractured slate bedrock is at a depth of 54 inches. In some small areas, the surface layer is silty clay loam. In some uneroded areas, it is gravelly silt loam. In other small areas, the subsoil is yellowish red.

Included in this unit in mapping are small areas of Georgeville, Badin, and Secrest soils. Georgeville soils are very deep over bedrock and are well drained. They are on broad, smooth slopes. Badin soils are moderately deep over bedrock and are well drained. They are dominantly on the more dissected, narrow slopes. Secrest soils are deep over bedrock and are

moderately well drained. They are along intermittent drainageways and in small depressional areas. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is moderate in the Tatum soil. Available water capacity also is moderate. Reaction is strongly acid or very strongly acid in the subsoil and underlying material. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is moderate. The hazard of further erosion is severe in bare or unprotected areas. The depth to weathered bedrock ranges from 40 to 60 inches. The depth to hard bedrock is more than 60 inches.

This map unit is used as woodland, cropland, hayland, or pasture.

This map unit is moderately suited to cultivated crops. Soybeans, grain sorghum, and small grain are the main crops. The slope, the content of clay in the surface layer, and surface runoff are the main limitations affecting crop production. Because of the relatively high content of clay in the surface layer, this soil is somewhat difficult to till and seed germination is restricted. Tillage is restricted after heavy rains. Conservation tillage, crop residue management, and cover crops, such as grasses and legumes, improve tilth and help to control runoff and erosion. Other conservation practices, such as sodded drainageways, diversions, stripcropping, field borders, and crop rotations that include close-growing crops, conserve soil and water.

This map unit is well suited to pasture and hay. Maintaining an adequate plant cover helps to control runoff and erosion. Proper applications of fertilizer and lime and controlled grazing are needed.

This map unit is well suited to woodland. The dominant trees are loblolly pine, shortleaf pine, Virginia pine, yellow-poplar, hickory, white oak, and northern red oak. The main understory trees and shrubs are dogwood, sourwood, holly, eastern redcedar, redbud, black cherry, red maple, and sassafras. The main management concerns are the hazard of erosion, an equipment limitation, and seedling mortality. Limiting the use of equipment when the soil is wet minimizes compaction and reduces the hazard of erosion. Maintaining a plant cover also helps to control erosion.

This map unit is poorly suited to urban development. The moderate permeability, the slope, the clayey texture of the subsoil, the moderate shrink-swell potential, and low strength are the main limitations affecting most urban uses. The hazard of erosion is very severe on construction sites if the ground cover is removed. Small stones on the surface and the slope are the main limitations affecting most recreational uses.

The capability subclass is IVe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8A.

TuB—Tatum-Urban land complex, 2 to 8 percent slopes. This map unit occurs mainly as areas of a deep, well drained Tatum soil and areas of Urban land. It is about 60 percent Tatum soil and 25 percent Urban land. The Tatum soil and Urban land occur as areas so intricately mixed that mapping them separately is not practical at the selected scale. Individual areas vary in shape and range from about 25 to 300 acres in size.

Typically, the surface layer of the Tatum soil is yellowish red gravelly silty clay loam 6 inches thick. The subsoil is 39 inches thick. In the upper part, it is red silty clay. In the next part, it is red silty clay that has strong brown mottles. In the lower part, it is mottled red, strong brown, and yellow silty clay loam. The underlying material extends to a depth of 54 inches. It is multicolored silt loam that weathered from saprolite. Weathered, fractured slate bedrock is at a depth of 54 inches.

Included in this unit in mapping are small areas of Georgeville, Badin, and Secrest soils. Georgeville soils are very deep over bedrock and are well drained. They are on broad, smooth slopes. Badin soils are moderately deep over bedrock and are well drained. They are dominantly on narrow slopes and in undulating areas. Secrest soils are deep over bedrock and are moderately well drained. They are along intermittent drainageways and in small depressional areas. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is moderate in the Tatum soil. Available water capacity also is moderate. Reaction is strongly acid or very strongly acid in the subsoil and underlying material. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is moderate. The hazard of further erosion is moderate in bare or unprotected areas. The depth to weathered bedrock ranges from 40 to 60 inches. The depth to hard bedrock is more than 60 inches.

The Urban land consists of areas where the original soil has been cut, filled, graded, or otherwise altered. These areas are used for closely spaced houses or other buildings or are covered with pavement. The slope generally has been modified. Surface runoff from rooftops and paved surfaces increases the hazard of flooding in low downstream areas. The depth to bedrock, the clayey texture of the subsoil, low strength, and the moderate shrink-swell potential in the Tatum soil are the main limitations affecting most urban uses. Onsite investigation is generally needed before use and management of these areas can be planned.

The capability subclass is IIe in areas of the Tatum

soil and VIIIs in areas of the Urban land. This map unit has not been assigned a woodland ordination symbol.

Ud—Udorthents, loamy. This map unit consists of areas where the natural soil has been altered by earthmoving operations. These areas include borrow pits, gold mines, landfills, and rock quarries. These altered soils are predominantly loamy. The thickness of the soil material, type of underlying material, and slope vary. Individual areas are irregular in shape and range from 4 to more than 50 acres in size.

Borrow pits are areas from which all of the original soil and much of the underlying layers have been removed for use as fill material or construction aggregate. Cuts are 3 to 25 feet deep over bedrock. The base surface in these cuts generally is uneven. The exposed surface layer consists mainly of weathered bedrock or is partly covered by mounds of spoil material.

Included in this unit in mapping with the borrow pits are ponds and small areas that are intermittently ponded. Also included are small areas of fill material that had been pushed aside during excavation and small areas of undisturbed natural soils.

Most borrow pits have naturally reseeded to wild grasses, weeds, shortleaf pine, and Virginia pine. They commonly have poor physical properties for plant growth. The rooting depth generally is shallow, and available water capacity, soil fertility, and content of organic matter are low. Generally, major reclamation is needed to prepare these areas for the economic production of plants or for any other development purpose. The included ponded and vegetated areas provide wildlife habitat.

Gold mines are areas from which both surface and subsurface material has been removed. These areas may have shafts several feet deep over bedrock. Spoil tailings are piled onsite. Most of these areas have highly irregular surfaces. Abandoned areas have partially stabilized under pine, eastern redcedar, and other vegetation. Some active mining areas are bare and subject to accelerated erosion.

Landfills are areas where graded trenches are backfilled with alternate layers of solid refuse and soil material. When a trench is full, a final cover of about 2 feet of soil is placed on the surface. These areas commonly are sloping after the final cover has been added and grading has been completed.

Included in this unit in mapping with the landfills are areas of undisturbed soil. These areas commonly are near the edge of the mapped areas. The soil between the trenches is relatively undisturbed, except for the final cover used to smooth the entire area. These areas generally have been reseeded and are being maintained. The characteristics of the soil material vary to such a degree that onsite investigation is needed before interpretive statements can be made.

Quarries are areas from which the entire soil has been removed and part of the underlying bedrock has been used as a source for crushed stone or for the manufacture of bricks. The pits consist of vertical side walls, relatively smooth base slopes, and localized mounding of spoil material or tailings. Depth of the pits ranges from 10 to more than 100 feet. Most areas are irregular in shape and range from 4 to more than 25 acres in size.

The areas where mining is still in progress are usually void of vegetation, except for a few Virginia pine. Erosion is a hazard, but most sediments are trapped on site. Water is in the deepest levels of a few areas where quarrying is no longer active. These water areas are identified on the detailed soil maps.

The spoil material commonly has poor physical properties for establishing and supporting plant growth. The rooting depth generally is shallow, and the available water capacity, soil fertility, and content of organic matter are low or very low. Areas with adequate vegetative cover provide wildlife habitat.

Onsite investigation is needed before use and management can be planned.

The capability subclass is VIIe. This map unit has not been assigned a woodland ordination symbol.

WhB—White Store loam, 2 to 8 percent slopes. This map unit consists mainly of deep, moderately well drained, gently sloping White Store and similar soils on ridges in the uplands. Individual areas are irregular in shape and range from 4 to more than 50 acres in size.

Typically, the surface layer is dark brown loam 6 inches thick. The subsoil is 44 inches thick. In the upper part, it is yellowish red clay. In the next part, it is yellowish red clay that has light brownish gray, brown, and red mottles. In the lower part, it is dark red silty clay that has light brownish gray mottles. Weathered siltstone is at a depth of about 50 inches. In some eroded areas where the upper part of the subsoil has been mixed with the surface soil by plowing, the surface layer is clay loam. In other areas the surface layer is gravelly loam.

Included in this unit in mapping are small areas of very deep, moderately well drained and somewhat poorly drained Creedmoor soils. These soils are in the lower parts of the mapped areas. Also included are small areas of soils that have less clay in the subsoil than the White Store soil and small areas that are well drained. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is very slow in the White Store soil.

Available water capacity is moderate. Reaction is very strongly acid or strongly acid in the subsoil and underlying material. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is very high. A seasonal high water table is perched between 1.0 foot and 1.5 feet below the surface from December through March. The hazard of erosion is moderate in bare or unprotected areas. The depth to weathered bedrock ranges from 40 to 60 inches. The depth to hard bedrock is more than 60 inches.

Most of this map unit is used as woodland. Other areas are used for crops, hay, or pasture.

This map unit is moderately suited to cultivated crops. Corn, soybeans, grain sorghum, and small grain are the main crops. The slope, the very slow permeability, the wetness, surface runoff, and the hazard of erosion are the main management concerns affecting crop production. Because of the very slow permeability, tillage is restricted after heavy rains. Conservation tillage, crop residue management, and cover crops, such as grasses and legumes, improve tilth and help to control runoff and erosion. A surface drainage system may be needed in the less sloping areas. Other conservation practices, such as sodded drainageways, diversions, stripcropping, field borders, and crop rotations that include close-growing crops, conserve soil and water.

This map unit is well suited to pasture and hay. Maintaining an adequate plant cover helps to control runoff and erosion.

This map unit is moderately suited to woodland. The dominant trees are loblolly pine, shortleaf pine, Virginia pine, eastern redcedar, white oak, and post oak. The main understory trees and shrubs are dogwood, sourwood, holly, redbud, black cherry, red maple, and sassafras. The main management concerns are the hazard of erosion, an equipment limitation, and seedling mortality because of the heavy, plastic clay in the subsoil. Limiting the use of equipment when the soil is wet minimizes compaction and reduces the hazard of erosion. Maintaining a plant cover also helps to control erosion. Reforestation activities should be restricted to when the water table is at its lowest level.

This map unit is poorly suited to urban development. The very slow permeability, the very high shrink-swell potential, the wetness, and low strength are the main limitations affecting most urban uses. The hazard of erosion is moderate on construction sites if the ground cover is removed. The very slow permeability and the wetness are the main limitations affecting most recreational uses.

The capability subclass is IIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 7C.

WhC—White Store loam, 8 to 15 percent slopes. This map unit consists mainly of deep, moderately well drained White Store and similar soils on upland ridges and side slopes. These areas are on hilly side slopes. Individual areas are irregular in shape and range from 4 to more than 50 acres in size.

Typically, the surface layer is dark brown loam 6 inches thick. The subsoil is 44 inches thick. In the upper part, it is yellowish red clay. In the next part, it is yellowish red clay that has light brownish gray, brown, and red mottles. In the lower part, it is dark red silty clay that has light brownish gray mottles. Weathered siltstone is at a depth of about 50 inches. In some eroded areas where the upper part of the subsoil has been mixed with the surface soil by plowing, the surface layer is clay loam. In other areas the surface layer is gravelly loam.

Included in this unit in mapping are small areas of very deep, moderately well drained and somewhat poorly drained Creedmoor soils. These soils are mainly on toe slopes. Also included are small areas of soils that have less clay in the subsoil than the White Store soil and small areas that are well drained. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is very slow in the White Store soil. Available water capacity is moderate. Reaction is very strongly acid or strongly acid in the subsoil and underlying material. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is very high. A seasonal high water table is 1.0 foot to 1.5 feet below the surface from December through March. The hazard of erosion is severe in bare or unprotected areas. The depth to weathered bedrock ranges from 40 to 60 inches. The depth to hard bedrock is more than 60 inches.

All of the acreage of this map unit is used as woodland.

This map unit is poorly suited to cultivated crops. The slope, the very slow permeability, the wetness, surface runoff, and the hazard of erosion are the main management concerns affecting crop production.

This map unit is well suited to pasture and hay. Maintaining an adequate plant cover helps to control runoff and erosion.

This map unit is moderately suited to woodland. The dominant trees are loblolly pine, shortleaf pine, Virginia pine, eastern redcedar, white oak, and post oak. The main understory trees and shrubs are dogwood, sourwood, holly, redbud, black cherry, red maple, and sassafras. The main management concerns are the hazard of erosion, an equipment limitation, and seedling

mortality because of the heavy, plastic clay in the subsoil. Limiting the use of equipment when the soil is wet minimizes compaction and reduces the hazard of erosion. Maintaining a plant cover also helps to control erosion. Reforestation activities should be restricted to when the water table is at its lowest.

This map unit is poorly suited to urban uses. The very slow permeability, the very high shrink-swell potential, the wetness, the slope, and low strength are the main limitations affecting most urban uses. The hazard of erosion is severe on construction sites if the ground cover is removed. The very slow permeability, the wetness, and the slope are the main limitations affecting most recreational uses.

The capability subclass is IIIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 7C.

ZnB—Zion gravelly loam, 2 to 8 percent slopes. This map unit consists mainly of moderately deep, well drained, gently sloping Zion and similar soils on ridges in the uplands. These soils occur with intrusions or dikes of igneous materials. Individual areas are oval and range from 4 to more than 200 acres in size.

Typically, the surface layer is brown gravelly loam 8 inches thick. The subsoil is 18 inches thick. In the upper part, it is yellowish brown gravelly clay loam. In the next part, it is dark yellowish brown clay that has yellowish brown mottles. In the lower part, it is mottled yellowish brown and brown clay loam. The underlying material extends to a depth of 30 inches. It is multicolored gravelly clay loam that weathered from saprolite. Hard mafic bedrock is at a depth of about 30 inches. In some areas the surface layer is gravelly silt loam. In other small areas, it is loam. In some eroded areas where the upper part of the subsoil has been mixed with the surface soil by plowing, the surface layer is gravelly clay loam.

Included in this unit in mapping are small areas of Mecklenburg and Iredell soils. Mecklenburg soils are very deep and well drained. They are on knolls. Iredell soils are deep over bedrock and are moderately well drained and somewhat poorly drained. They are in depressional areas. Also included are soils that are more than 40 inches deep over bedrock and soils that are less than 20 inches deep over bedrock and have less clay than the Zion soil. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is slow in the Zion soil. Available water capacity is low. Reaction ranges from strongly acid to neutral in the subsoil and underlying material. It varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is high. The depth to hard bedrock ranges from 20 to 40 inches.

This map unit is used as cropland, pasture, hayland, or woodland.

This map unit is moderately suited to corn, soybeans, and milo. The slow permeability, the low available water capacity, and surface runoff are the main limitations affecting crop production. Tillage is restricted after heavy rains because of the slow permeability. Grassed waterways can maintain open drainageways and remove surface water. Other applicable conservation practices are conservation tillage, crop residue management, field borders, stripcropping, crop rotations, and sodded drainageways.

This map unit is moderately suited to hay and pasture. The low available water capacity and the slow permeability are the main limitations. Controlled grazing and applications of fertilizer are needed.

This map unit is moderately suited to woodland. The dominant trees are loblolly pine, shortleaf pine, Virginia pine, eastern redcedar, white oak, hickory, blackjack oak, and northern red oak. The main understory trees are red maple, redbud, sourwood, blackgum, black cherry, and dogwood. Plant competition is a management concern. Reforestation must be carefully managed to minimize competition from undesirable understory plants.

This map unit is poorly suited to urban development. The main limitations affecting most urban uses are the depth to bedrock; the slow permeability; the high shrink-swell potential; the plastic, clayey texture of the subsoil; and low strength. The slow permeability and small stones on the surface are the main limitations affecting recreational uses.

The capability subclass is IIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 6A.

ZnC—Zion gravelly loam, 8 to 15 percent slopes. This map unit consists mainly of moderately deep, well drained, strongly sloping Zion and similar soils on side slopes in the uplands. It is in complex areas. These soils occur with intrusions or dikes of igneous materials. Individual areas generally are long and narrow and range from 4 to more than 25 acres in size.

Typically, the surface layer is brown gravelly loam 8 inches thick. The subsoil is 18 inches thick. In the upper part, it is yellowish brown gravelly clay loam. In the next part, it is dark yellowish brown clay that has yellowish brown mottles. In the lower part, it is mottled yellowish brown and brown clay loam. The underlying material extends to a depth of 30 inches. It is multicolored gravelly clay loam that weathered from saprolite. Hard mafic bedrock is at a depth of about 30 inches. In some small areas, the surface layer is gravelly silt loam. In other small areas, it is loam. In some eroded areas

where the upper part of the subsoil has been mixed with the surface soil by plowing, the surface layer is gravelly clay loam.

Included in this unit in mapping are small areas of Mecklenburg and Iredell soils. Mecklenburg soils are very deep over bedrock and are well drained. They are in the smoother, less sloping areas. Iredell soils are deep over bedrock and are moderately well drained and somewhat poorly drained. They are at the head of drainageways. Also included are soils that are more than 40 inches deep over bedrock, soils that are less than 20 inches deep over bedrock and have less clay than the Zion soil, and some areas that have slopes of less than 8 percent. Contrasting inclusions make up about 15 percent of this map unit.

Permeability is slow in the Zion soil. Available water capacity is low. Reaction ranges from strongly acid to neutral in the subsoil and underlying material. It varies widely in the surface layer and subsurface layer as a result of local liming practices. The shrink-swell potential is high. The depth to hard bedrock ranges from 20 to 40 inches.

This map unit is used mostly as woodland, pasture, or hayland.

This map unit is poorly suited to cropland. The slow permeability, the low available water capacity, the slope, and surface runoff are the main limitations affecting crop production.

This map unit is moderately suited to hay and pasture. The slope, the low available water capacity, and the slow permeability are the main limitations. Controlled grazing and applications of fertilizer are needed.

This map unit is moderately suited to woodland. The dominant trees are loblolly pine, shortleaf pine, Virginia pine, eastern redcedar, white oak, hickory, blackjack oak, and northern red oak. The main understory trees are red maple, redbud, sourwood, blackgum, black cherry, and dogwood. Plant competition is a management concern. Reforestation must be carefully managed to minimize competition from undesirable understory plants.

This map unit is poorly suited to urban development. The main limitations affecting most urban uses are the depth to bedrock; the slow permeability; the slope; the high shrink-swell potential; the plastic, clayey texture of the subsoil; and low strength. The slope, the slow permeability, and small stones on the surface are the main limitations affecting recreational uses.

The capability subclass is IIIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 6A.

Prime Farmland

In this section, prime farmland is defined and the soils in Union County that are considered prime farmland are listed.

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, State, and Federal levels, as well as individuals, must encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to food, feed, forage, fiber, and oilseed crops. Such soils have properties that favor the economic production of sustained high yields of crops. The soils need only to be treated and managed by acceptable farming methods. The moisture supply must be adequate, and the growing season must be sufficiently long. Prime farmland soils produce the highest yields with minimal expenditure of energy and economic resources. Farming these soils results in the least damage to the environment.

Prime farmland soils may presently be used as cropland, pasture, or woodland or for other purposes. They are used for food or fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water-control structures. Public land is land not available for farming in National forests, National parks, military reservations, and State parks.

Prime farmland soils usually receive an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The acidity or alkalinity level of the soils is acceptable. The soils have few or no rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not frequently flooded during the growing season. The slope ranges mainly from 0 to 8 percent.

About 112,600 acres, or about 28 percent of Union County, meets the requirements for prime farmland. The following map units are considered prime farmland. The location of each map unit is shown on the detailed soil maps at the back of this publication. The extent of each unit is given in table 4. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

Some soils that have a high water table and all soils that are frequently flooded during the growing season qualify as prime farmland only in areas where these limitations have been overcome by drainage measures or flood control. If applicable, the need for these measures is indicated in parentheses after the map unit name in the following list. Onsite evaluation is necessary to determine whether or not limitations have been overcome by corrective measures.

The soils identified as prime farmland in Union County are:

ApB	Appling sandy loam, 2 to 8 percent slopes
CeB2	Cecil gravelly sandy clay loam, 2 to 8 percent slopes, eroded
ChA	Chewacla silt loam, 0 to 2 percent slopes, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
CrB	Creedmoor loam, 2 to 8 percent slopes
GaB2	Gaston clay loam, 2 to 8 percent slopes, eroded
GeB	Georgeville silt loam, 2 to 8 percent slopes
GfB2	Georgeville silty clay loam, 2 to 8 percent slopes, eroded
HeB	Helena fine sandy loam, 2 to 8 percent slopes

MeB2 Mecklenburg sandy clay loam, 2 to 8 percent slopes, eroded
TaB Tatum gravelly silt loam, 2 to 8 percent slopes
TbB2 Tatum gravelly silty clay loam, 2 to 8 percent slopes, eroded

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help to prevent construction failures caused by unfavorable soil properties.

Generally, the soils in Union County that are well suited to crops also are well suited to urban uses. The data concerning specific soils in the county can be used in planning future land use patterns. The potential for farming should be considered relative to any soil limitations and the potential for nonfarm development.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern that is in harmony with nature.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Phil Loudermilk, district conservationist, and Bobby G. Brock, agronomist, Natural Resources Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils are identified; the system of land capability classification used by the Natural Resources Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units" and in the tables. Specific information can be obtained from the local office of the Natural Resources Conservation Service or the North Carolina Cooperative Extension Service.

In 1987, Union County had approximately 92,620 acres of cropland, 34,791 acres of pasture, and 8,222 acres of hayland *(13)*. Corn was grown on 20,491 acres, soybeans on 49,540 acres, sorghum on 2,622 acres, and wheat on 21,081 acres. A large percentage of the acreage planted to small grain was doubled cropped with soybeans. A small percentage of the acreage of cropland was used for truck crops, such as vegetables, sweet corn, and berries.

Soybeans and corn are the primary crops in the county. Each year they are extensively planted on Badin, Cid, Georgeville, Tatum, and Cecil soils, which are well suited to these crops. These soils are also suited to milo, which is another important field crop. A fairly large acreage of Goldston soils also is planted to soybeans, corn, and milo. These soils are poorly suited to these crops because of droughtiness. Small grains, primarily wheat, are an important part of the crop rotation systems in the county. Those soils that are best suited to the production of corn, soybeans, and milo also are best suited to the production of small grain.

Those soils that are best suited to field crops, primarily Cid, Georgeville, Tatum, Cecil, and Appling soils, also are well suited to the production of

Figure 8.—Rill erosion in an area of cropland in Union County.

horticultural crops, such as strawberries, sweet corn, green beans, and peas. The latest information on the production of such crops can be obtained from the North Carolina Cooperative Extension Service and the Natural Resources Conservation Service.

Fescue and clover are the primary plants in pasture and hayland in the county. The soils in the county are generally well suited to this cool-season forage combination. A small acreage of hayland and pasture supports hybrid bermudagrass. A well-rounded management program for pasture and hayland includes species, such as bermudagrass, that are adapted to the summer and cool-season grasses or grass-legume mixtures. If proper fencing is installed to allow for rotation of grazing stock and an intensive management program for the application of fertilizer is used, pastures can produce sufficient forage for grazing from March through November, and alfalfa, sericea lespedeza, red clover, orchardgrass, and hybrid bermudagrass can be used for hay during the winter. These combinations provide a successful program for pasture and hayland. Perennials are normally preferred in a forage program because they provide better erosion-control benefits and lower production costs. Other forages that are adapted to the soils in the county include switchgrass, bluestem, and improved perennial lespedezas.

Erosion is a major concern on about 75 percent of the cropland and pasture in the county (fig. 8). Many of the soils have moderate to steep slopes and low tolerance to erosion. Erosion is costly for various reasons. Productivity decreases as the surface layer, which contains most of the fertility in a soil, is washed away. Social and environmental costs increase if eroded materials are deposited in rivers and reservoirs.

Effective control of erosion maintains agricultural productivity and the quality of water for municipal uses, for recreation, and for wildlife.

Loss of the surface layer is especially damaging on soils, such as Georgeville, Cecil, and Tatum soils, that have a clayey subsoil and on soils, such as Goldston soils, that are shallow over bedrock. As clay from the subsoil is mixed into the surface layer, available water capacity declines, the need for lime and fertilizer increases, and tilth deteriorates. The clay is sticky when wet and hard when dry and thus makes the preparation of a good seedbed difficult. Also, Tatum, Cecil, Badin, Gaston, and Georgeville soils are prone to crusting in areas where clay has been mixed into the surface layer, especially in the most eroded areas. The crust that forms limits the infiltration of water into the soil, causing rapid surface runoff and increasing the rate of erosion. The crust and poor tilth interfere with seed germination and reduce yields. Because of crusting, fall plowing is generally not a good practice on the soils in the county that are eroded or that have a surface texture of silt loam. Many soils that are plowed in the fall are nearly as hard and dense at planting time as they were before they were plowed.

Erosion-control practices provide a protective cover for the surface layer, help to control runoff, and increase the rate of water infiltration. Using crop residue or winter cover crops holds losses due to erosion to amounts that do not reduce the productive capacity of the soil.

A well managed pasture is protected against erosion by a permanent plant cover. Legumes and grasses used for forage can be incorporated into a cropping system to help to control erosion in sloping areas. They also provide nitrogen for the following crop and improve tilth.

Contour tillage and stripcropping are effective conservation practices on many soils. They generally are best suited to soils, such as Tatum, Cecil, and Georgeville soils, that have a fairly uniform slope, but they can be adapted to a wide range of slope patterns. If forage is needed, a very strong system to control erosion can be achieved by rotating forage and field crops in strips. Conservation tillage and field stripcropping together may provide better erosion control than either practice alone.

Conservation tillage is very effective in controlling erosion on sloping soils. It can be used on many soils in the county. Examples are Georgeville, Tatum, Badin, and Cecil soils.

Terraces and diversions help to control erosion by intercepting excess surface runoff and safely routing it to suitable outlets. They are highly effective, particularly in conjunction with conservation tillage, on soils that have uniform slopes. Examples are Tatum and Georgeville soils.

Grassed waterways, which are usually seeded to fescue, provide safe disposal areas for surplus water from runoff and from terraces and diversions (fig. 9). Field borders, which also are usually seeded to fescue, filter sediment from runoff and provide areas to turn equipment and to gain access to fields. Grassed waterways and field borders are highly effective on many of the soils in the county.

In many areas of the Tatum, Badin, and Goldston soils, slopes are so short and irregular that contour tillage and parallel terraces are not practical. In these areas a conservation cropping system that includes a substantial cover of plants and crop residue is needed to control erosion. Conservation tillage practices, including minimum-till, reduced tillage, and no-till, are very effective in controlling erosion on these soils. These practices also conserve soil moisture by providing cover and maintaining good infiltration at the surface. They are suited to most of the soils in the uplands in the county. Weed-control problems should be a determining factor affecting decisions about conservation tillage.

Information concerning the design and applicability of erosion-control measures for each type of soil can be obtained from the local office of the Natural Resources Conservation Service.

Poor drainage is a problem on about 30 percent of the pasture and cropland in the county, including areas of Misenheimer and Cid soils. Tillage can aggravate the problem by creating low areas and by creating high areas that block surface drainage. Grassed waterways and surface shaping can improve surface drainage. A tile drainage system is difficult to install in areas of these soils because of a lack of suitable outlets and because of the shallow depth to bedrock in the Misenheimer soil.

Wet spots, seeps, and springs are in areas of many of the soils in the county. In such areas a tile drainage system is useful for moving water to a suitable outlet.

Rock fragments are common in many of the soils in the county. Some of these rock fragments are very hard and cause excessive wear to farm equipment. Examples are flint (white quartz) and blue slate (argillite). Flint is white, hard, and appears glassy. It is in many parts of the county, particularly in areas of Tatum and Cecil soils. Blue slate is associated with Goldston and Misenheimer soils. Dirt rock (weathered siltstone and mudstone) is associated with Badin and Cid soils. It is not as hard as flint or blue slate and thus is not as damaging to farm equipment.

Tilth is an important factor affecting crop production. It has a strong influence on seed germination, water

Figure 9.—A grassed waterway in an area of Badin channery silt loam, 2 to 8 percent slopes.

infiltration, and air exchange. The surface layer of soils that have good tilth is granular and porous. Adding organic matter, such as crop residue and manure, minimizes crusting and improves soil structure and tilth.

Chemical Weed Control

The use of herbicides for weed control is a common practice on the cropland in Union County. It decreases the need for tillage and is an integral part of modern farming. Selected soil properties, such as organic matter content and texture of the surface layer, affect the rate of herbicide application. Estimates of both of these properties were determined for the soils in the county. Table 14 shows a general range of organic matter content in the surface layer of the soils. The texture of the surface layer is shown in the USDA texture column in table 13.

In some areas the organic matter content projected for the different soils is outside the range shown in the table. The content can be higher in soils that have received large amounts of animal or manmade waste. Soils that have recently been brought into cultivation may have a higher content of organic matter in the surface layer than similar soils that have been cultivated for a long time. Conservation tillage can increase the content of organic matter in the surface layer. A lower content of organic matter is common where the surface layer has been partly or completely removed by erosion or land smoothing. Current soil tests should be used for specific organic matter determinations.

Soil Fertility

The soils in Union County generally are low in natural fertility. They are naturally acid. Additions of

lime and fertilizer are needed for the production of most kinds of crops.

Liming requirements are a major concern on cropland. The acidity level in the soil affects the availability of many nutrients to plants and the activity of beneficial bacteria. Lime also neutralizes exchangeable aluminum in the soil and thus counteracts the adverse effects of high levels of aluminum on many crops. Liming adds calcium (from calcitic lime) or calcium and magnesium (from dolomitic lime) to the soil.

A soil test is a guide to what amount and kind of lime should be used. The desired pH levels may differ, depending on the soil properties and the crop to be grown.

Nitrogen fertilizer is required for most crops. It is generally not required, however, for clover, in some rotations of soybeans, or for alfalfa that is established. A reliable soil test is not available for predicting nitrogen requirements. Appropriate rates of nitrogen application are described in the section "Yields per Acre."

Soil tests can indicate the need for phosphorus and potassium fertilizer. They are needed because phosphorus and potassium tend to build up in the soil.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

A high level of management includes maintaining proper soil reaction and fertility levels as indicated by standard soil tests. The application rate of nitrogen for corn on soils that have a yield potential of 125 to 150 bushels per acre should be 140 to 160 pounds per acre. If the yield potential for corn is 100 bushels per acre or less, a rate of 100 to 120 pounds of nitrogen per acre should be used. The application of nitrogen in excess of that required for potential yields generally is not recommended. The excess nitrogen fertilizer that is not utilized by a crop is an unnecessary expense and causes a hazard of water pollution. If corn or cotton is grown after the harvest of soybeans or peanuts, nitrogen rates can be reduced by about 20 to 30 pounds per acre. Because nitrogen can be readily leached from sandy soils, applications may be needed on these soils more than once during the growing season.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the North Carolina Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for use as cropland *(9)*. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode, but they have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless a close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

There are no subclasses in class I because the soils of this class have few limitations. The soils in class V are subject to little or no erosion, but they have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation. Class V contains only the subclasses indicated by *w, s,* or *c.*

The capability classification of the map units is given in the section "Detailed Soil Map Units" and in table 5.

Woodland Management and Productivity

Albert Coffey, forester, Natural Resources Conservation Service, helped prepare this section.

Forest managers in Union County are faced with the challenge of producing greater yields from smaller areas. Meeting this challenge requires intensive management and silvicultural practices. Many modern silvicultural techniques resemble those long practiced in agriculture. They include establishing, weeding, and thinning a desirable young stand; propagating the more productive species and genetic varieties; providing short rotations and complete fiber utilization; controlling insects, diseases, and weeds; and improving tree growth by applications of fertilizer and the installation of a drainage system. Even though timber crops require decades to grow, the goal of intensive management is similar to the goal of intensive agriculture. This goal is to produce the greatest yield of the most valuable crop as quickly as possible.

Commercial forests cover 178,206 acres, or about 44 percent of the land area of Union County *(8).* For purposes of forest inventory, the predominant forest type groups identified in Union County are described in the following paragraphs.

Loblolly-shortleaf. This forest type covers 33,654 acres. It is predominantly loblolly pine, shortleaf pine, or other kinds of southern yellow pine (excluding longleaf pine or slash pine) or a combination of these species. Commonly included trees are oak, hickory, and gum.

Oak-pine. This forest type covers 29,440 acres. It is predominantly hardwoods, usually upland oaks. Pine species make up 25 to 50 percent of the stand. Commonly included trees are gum, hickory, and yellow-poplar.

Oak-hickory. This forest type covers 101,001 acres. It is predominantly upland oaks or hickory, or both. Commonly included trees are yellow-poplar, elm, maple, and black walnut.

Oak-gum-cypress. This forest type covers 6,966 acres. It is bottom-land forest consisting predominantly of tupelo, blackgum, sweetgum, oaks, southern cypress, or a combination of these species. Commonly included trees are cottonwood, willow, ash, elm, hackberry, and maple.

Elm-ash-cottonwood. This forest type covers 6,965 acres. It is predominantly elm, ash, cottonwood, or a combination of these species. Commonly included trees are willow, sycamore, beech, and maple.

Commercial forest is land that is producing or is capable of producing crops of industrial wood and that has not been withdrawn from timber production. Loblolly pine is the most important timber species in the county because it grows fast, is adapted to the soil and climate, brings the highest average sale value per acre, and is easy to establish and manage.

One of the first steps in planning intensive woodland management is to determine the potential productivity of the soil for several alternative tree species. The most productive and valued trees are then selected for each soil type. Site and yield information enables a forest manager to estimate future wood supplies. These estimates are the basis of realistic decisions concerning expenses and profits associated with intensive woodland management, land acquisition, or industrial investments.

The potential productivity of woodland depends on physiography, soil properties, climate, and the effects of past management. Specific soil properties and site characteristics, including soil depth, texture, structure, and depth to the water table, affect forest productivity

primarily by influencing available water capacity, aeration, and root development. The net effects of the interaction of these soil properties and site characteristics determine the potential site productivity.

Other site factors are also important. The gradient and length of slopes affect water movement and availability. The amount of rainfall and length of growing season influence site productivity.

This soil survey can be used by woodland managers planning ways to increase the productivity of forest land. Some soils respond better to applications of fertilizer than others, and some are more susceptible to erosion after roads are built and timber is harvested. Some soils require special reforestation efforts. In the section "Detailed Soil Map Units," the description of each map unit in the survey area suitable for timber includes information about productivity, limitations in harvesting timber, and management concerns in producing timber. The common forest understory plants also are listed. Table 6 summarizes this forestry information and rates the soils for a number of factors to be considered in management. *Slight, moderate,* and *severe* are used to indicate the degree of the major soil limitations to be considered in forest management.

Table 6 lists the *ordination symbol* for each soil. The first part of the ordination symbol, a number, indicates the potential productivity of a soil for the indicator species in cubic meters per hectare per year. The larger the number, the greater the potential productivity. Potential productivity is based on the site index and the point where mean annual increment is the greatest.

The second part of the ordination symbol, a letter, indicates the major kind of soil limitation affecting use and management. The letter *R* indicates a soil that has a significant limitation because of the slope. The letter *X* indicates that a soil has restrictions because of stones or rocks on the surface. The letter *W* indicates a soil in which excessive water, either seasonal or year-round, causes a significant limitation. The letter *T* indicates a soil that has, within the root zone, excessive alkalinity or acidity, sodium salts, or other toxic substances that limit the development of desirable trees. The letter *D* indicates a soil that has a limitation because of a restricted rooting depth, such as a shallow soil that is underlain by hard bedrock, a hardpan, or other layers that restrict roots. The letter *C* indicates a soil that has a limitation because of the kind or amount of clay in the upper part of the profile. The letter *S* indicates a dry, sandy soil. The letter *F* indicates a soil that has a large amount of coarse fragments. The letter *A* indicates a soil having no significant limitations that affect forest use and management. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, and F.

Ratings of the *erosion hazard* indicate the probability that damage may occur if site preparation or harvesting activities expose the soil. The risk is *slight* if no particular preventive measures are needed under ordinary conditions; *moderate* if erosion-control measures are needed for particular silvicultural activities; and *severe* if special precautions are needed to control erosion for most silvicultural activities. Ratings of moderate or severe indicate the need for construction of higher standard roads, additional maintenance of roads, additional care in planning harvesting and reforestation activities, or the use of special equipment.

Ratings of *equipment limitation* indicate limits on the use of forest management equipment, year-round or seasonal, because of such soil characteristics as slope, wetness, stoniness, and susceptibility of the surface layer to compaction. As slope gradient and length increase, the use of wheeled equipment becomes more difficult. On the steeper slopes, tracked equipment is needed. On the steepest slopes, even tracked equipment cannot be operated and more sophisticated systems are needed. The rating is *slight* if equipment use is restricted by wetness for less than 2 months and if special equipment is not needed. The rating is *moderate* if slopes are so steep that wheeled equipment cannot be operated safely across the slope, if wetness restricts equipment use from 2 to 6 months per year, if stoniness restricts the use of ground-based equipment, or if special equipment is needed to prevent or minimize compaction. The rating is *severe* if slopes are so steep that tracked equipment cannot be operated safely across the slope, if wetness restricts equipment use for more than 6 months per year, if stoniness restricts the use of ground-based equipment, or if special equipment is needed to prevent or minimize compaction. Ratings of moderate or severe indicate a need to choose the best suited equipment and to carefully plan the timing of harvesting and other management activities.

Ratings of *seedling mortality* refer to the probability of the death of the naturally occurring or properly planted seedlings of good stock in periods of normal rainfall, as influenced by kinds of soil or topographic features. Seedling mortality is caused primarily by too much water or too little water. The factors used in rating a soil for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, rooting depth, and the aspect of the slope. The mortality rate generally is highest on soils that have a sandy or clayey surface layer. The risk is *slight* if, after site preparation, expected mortality is less than 25 percent; *moderate* if expected mortality is between 25 and 50 percent; and *severe* if expected mortality exceeds 50 percent. Ratings of moderate or

severe indicate that it may be necessary to use containerized or larger than usual planting stock or to make special site preparations, such as bedding, furrowing, and providing artificial shade for seedlings. Reinforcement planting is often needed if the risk is moderate or severe.

Ratings of *windthrow hazard* indicate the likelihood that trees will be uprooted by the wind. A restricted rooting depth is the main reason for windthrow. The rooting depth can be restricted by a high water table, a fragipan, or bedrock or by a combination of such factors as wetness, texture, structure, and depth. The risk is *slight* if strong winds break trees but do not uproot them; *moderate* if strong winds blow a few trees over and break many trees; and *severe* if moderate or strong winds commonly blow trees over. Ratings of moderate or severe indicate that care is needed in thinning or that the stand should not be thinned at all. Special equipment may be needed to prevent damage to shallow root systems in partial cutting operations. A plan for the periodic removal of windthrown trees and the maintenance of a road and trail system may be needed.

The *potential productivity* of *common trees* on a soil is expressed as a *site index* and a *volume* number. Common trees are listed in table 6 in the order of their observed general occurrence. The table commonly lists four to six trees for each applicable map unit. Generally, only two or three tree species dominate. The first tree listed for each soil is the indicator species for that soil. An indicator species is a tree that is common in the area and that is generally the most productive on a given soil. Additional species that commonly occur on the soils may be listed in the detailed soil map unit descriptions.

For soils that are commonly used for timber production, the yield is predicted in cubic feet per acre per year. It is predicted at the point where mean annual increment culminates. The estimates of the productivity of the soils in this survey are based mainly on loblolly pine and shortleaf pine *(4)*.

The *site index* is determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years (50 years in this survey). This index applies to fully stocked, even-aged, unmanaged stands. Productivity of a site can be improved through management practices, such as bedding, applying fertilizer, and planting genetically improved species.

The *volume* is the yield likely to be produced by the most important trees, expressed in cubic feet per acre per year.

Trees to plant are those that are used for reforestation or, under suitable conditions, natural regeneration. They are suited to the soils and can produce a commercial wood crop. The desired product, topographic position (such as a low, wet area), and personal preference are three factors among many that can influence the choice of trees for use in reforestation. If hardwoods are desired on a forest site, natural reproduction from seeds and sprouts of acceptable species is effective. Special site preparation my be needed.

Recreation

A wide variety of recreational activities are available in Union County. Cane Creek Recreational Park is twelve miles southwest of Monroe. It covers 1,000 acres, including a 300-acre lake. It features water sports, picnic areas, nature trails, and fishing areas. Several large lakes and small ponds offer water-related recreational opportunities. A variety of other recreational facilities are available in the county. Because of plentiful game animals, such as deer, quail, doves, and rabbits, hunting is popular in the county.

In table 7, the soils of the survey area are rated according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 7, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 7 can be supplemented by other information in this survey, for example,

interpretations for septic tank absorption fields in table 10 and interpretations for dwellings without basements and for local roads and streets in table 9.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes, stones, or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

John P. Edwards, biologist, Natural Resources Conservation Service, helped prepare this section.

Small game, such as rabbits, quail, and dove, are plentiful throughout Union County. Deer also inhabit the county, but residential and industrial development is greatly reducing their habitat.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 8, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat. The ratings in table 8 are intended to be used as a guide and are not site specific. Onsite investigation is needed for individual management plans.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, and pokeberry.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwoods and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are autumn-olive and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine and cedar.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, cattail, rushes, and sedges.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, cottontail rabbit, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include thrushes, woodpeckers, squirrels, gray fox, and white-tailed deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, muskrat, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, the shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of

construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 9 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock or a very firm, dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. The depth to a high water table, depth to bedrock, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. The depth to bedrock, depth to a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), the shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, depth to a high water table, depth to bedrock, and the available water capacity in the upper 40 inches affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand or clay in the surface layer affect trafficability after vegetation is established. Soil tests are essential to determine liming and fertilizer needs. Help in making soil tests or in deciding what soil additive, if any, should be used can be obtained from the office of the Union Soil and Water Conservation District or the local office of the North Carolina Cooperative Extension Service.

Sanitary Facilities

Table 10 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction

costs, and possibly increased maintenance are required.

Table 10 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and that good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, depth to a high water table, depth to bedrock, and flooding affect absorption of the effluent. Large stones and bedrock interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. The animal waste lagoons commonly used in farming operations are not considered in the ratings. They are generally deeper than the lagoons referred to in the table and rely on anaerobic bacteria to decompose waste materials.

Table 10 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, depth to a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope or bedrock can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 10 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, depth to a water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the

surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 11 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and the shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* have more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. These soils have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 11, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is as much as 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of weathered bedrock, such as shale, siltstone, and weathered granite saprolite, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are naturally fertile or respond well to fertilizer and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel or stones, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel or stones, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred

for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and releases a variety of plant nutrients as it decomposes.

Water Management

Table 12 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives the restrictive features that affect each soil for drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability in the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area. Ponds that are less than about 2 acres in size are not shown on the soil maps because of the scale of mapping.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders. The depth to a high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock or to other layers that affect the rate of water movement, permeability, depth to a high water table or depth of standing water if the soil is subject to ponding, slope, susceptibility to flooding, subsidence of organic layers, and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone. Availability of drainage outlets is not considered in the ratings.

Federal and State regulations require that any area designated as wetlands cannot be altered without prior approval. Contact the local office of the Natural Resources Conservation Service for identification of hydric soils and potential wetlands.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock. The performance of a system is affected by the availability of suitable irrigation water, the depth of the root zone, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to help to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock affect the construction of terraces and diversions. Maintenance of terraces and diversions is adversely affected by a restricted rooting depth, a severe hazard of water erosion, and restricted permeability.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. Low available water capacity, restricted rooting depth, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed *(7)*. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 13 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages, by weight, of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, by volume, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20, or higher, for the poorest.

Rock fragments from 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

Physical and Chemical Properties

Table 14 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated content of clay in each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence the shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at ⅓-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of movement of water through the soil when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage in each major soil layer is stated in inches of water per inch of soil. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time. It is the difference between the amount of soil water at field moisture capacity and the amount at wilting point.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, more than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on

percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 14, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 15 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep or very deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep to very deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil listed in table 15 is assigned to two hydrologic groups, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary covering of the surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 15 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as *none, rare, occasional,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year). *Frequent* means that flooding occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most likely to occur is expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered is local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 15 are depth to the seasonal high water table; the kind of water table, that is, *perched* or *apparent;* and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 15.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water

stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate,* or *high.* It is based on soil texture, acidity, and the amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(10)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or on laboratory measurements. Table 16 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Ultisol.

SUBORDER. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udults (*Ud*, meaning a humid climate, plus *ult*, from Ultisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludults (*Hapl*, meaning minimal horizonation, plus *udults*, the suborder of the Ultisols that has a udic soil moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludults.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is clayey, mixed, thermic Typic Hapludults.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. There can be some variation in the texture of the surface layer or of the underlying material within a series. The Tatum series is an example of clayey, mixed, thermic Typic Hapludults.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described (fig. 10). The location of the typical pedon is described, and coordinates are identified by longitude and latitude. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(11)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(10)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

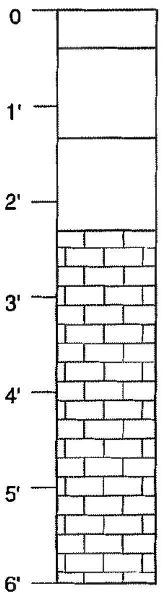
The map units of each soil series are described in the section "Detailed Soil Map Units."

Ailey Series

The Ailey series consists of very deep, well drained, slowly permeable soils on ridges and side slopes in the

PROFILE OF GOLDSTON SOIL

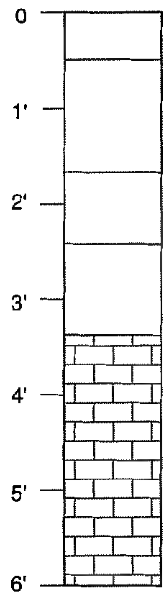
MAIN USE: Woodland
LIMITATIONS: Depth to rock, very low available water capacity



Ap-0 to 5"	Brown very channery silt loam
Bw-5 to 16"	Light yellowish brown very channery silt loam
Cr-16 to 27"	Weathered, fractured slate
R-27"	Hard, fractured slate rock

PROFILE OF BADIN SOIL

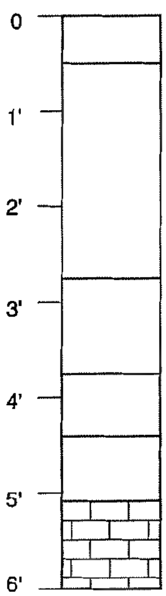
MAIN USES: Cropland, pasture
LIMITATIONS: Low strength, depth to rock, clayey subsoil



Ap-0 to 6"	Reddish brown channery silty clay loam
Bt-6 to 20"	Red silty clay
BC-20 to 29"	Red channery silty clay loam
Cr-29 to 41"	Weathered, fractured slate
R-41"	Hard, fractured slate rock

PROFILE OF TATUM SOIL

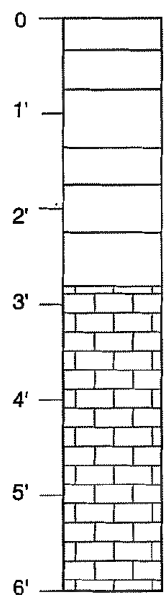
MAIN USES: Cropland, pasture
LIMITATION: Clayey subsoil



Ap-0 to 6"	Yellowish red gravelly silty clay loam
Bt-6 to 33"	Red silty clay
BC-33 to 45"	Mixed red, strong brown, and yellow silty clay loam
C-45 to 54"	Multicolored silt loam saprolite
Cr-54 to 61"	Weathered, fractured slate rock
R-61"	Hard, fractured slate rock

PROFILE OF CID SOIL

MAIN USES: Cropland, pasture, woodland
LIMITATIONS: Depth to rock, wetness, slow permeability



A-0 to 4"	Light brownish gray channery silt loam
E-4 to 9"	Pale yellow channery silt loam
Bt1-9 to 16"	Brownish yellow silty clay loam
Bt2-16 to 22"	Light olive brown silty clay that has light brownish gray mottles
BC-22 to 27"	Grayish brown and light olive brown channery silty clay
Cr-27 to 32"	Weathered, fractured slate rock
R-32"	Hard, fractured slate rock

Figure 10.—Soil profiles, major uses, and limitations of four dominant soils in Union County.

uplands. These soils formed in sandy and loamy marine sediments. Slopes range from 2 to 15 percent. The soils are loamy, siliceous, thermic Arenic Kanhapludults.

Ailey soils are commonly associated with Appling, Cecil, Georgeville, Helena, Pacolet, and Tatum soils. Appling, Cecil, Georgeville, and Tatum soils are in landscape positions similar to those of the Ailey soils. They have more than 35 percent clay in the particle-size control section. Appling and Cecil soils formed in material weathered from felsic crystalline rock. Georgeville and Tatum soils formed in material weathered from slate. Helena soils are in the lower landscape positions and are moderately well drained. Pacolet soils are on the steeper slopes. They have more than 35 percent clay in the particle-size control section.

Typical pedon of Ailey loamy sand, in an area of Ailey-Appling complex, 2 to 8 percent slopes; about 0.9 mile west on Secondary Road 1108 from its intersection with Secondary Road 1107, about 0.85 mile south on a farm road, 400 feet southwest in a cultivated field; USGS Catawba NE topographic quadrangle; lat. 34 degrees 53 minutes 33 seconds N. and long. 80 degrees 46 minutes 00 seconds W.

Ap—0 to 7 inches; brown (10YR 5/3) loamy sand; weak fine granular structure; very friable; many fine and medium roots; moderately acid; abrupt smooth boundary.

E—7 to 25 inches; light yellowish brown (10YR 6/4) loamy sand; weak fine granular structure; very friable; common fine roots; moderately acid; clear wavy boundary.

Bt1—25 to 36 inches; yellowish brown (10YR 5/8) sandy loam; weak fine subangular blocky structure; friable; few fine roots; strongly acid; gradual wavy boundary.

Bt2—36 to 48 inches; yellowish brown (10R 5/8) sandy clay loam; common fine prominent yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable; few fine roots; few pebbles; very strongly acid; gradual wavy boundary.

Btx—48 to 58 inches; mottled yellowish brown (10YR 5/8), very pale brown (10YR 7/3), and red (2.5YR 5/8) sandy clay loam; about 80 percent moderate medium subangular blocky structure and 20 percent moderate thick platy structure; firm; brittle and hard platy peds when dry; few fine roots along faces of peds; very strongly acid; gradual wavy boundary.

2Cd—58 to 76 inches; mottled brownish yellow (10YR 6/8), red (2.5YR 5/8), and light gray (10YR 7/2) coarse sandy loam; massive; about 10 percent platy peds that are hard and brittle when dry; few fine roots along faces of peds; firm; very strongly acid.

The thickness of the solum ranges from 42 to 60 inches. The depth to bedrock is more than 60 inches. Reaction is very strongly acid to slightly acid in the A and E horizons, except where the surface layer has been limed, and is very strongly acid or strongly acid in the B and C horizons. The content of coarse fragments ranges from 0 to 15 percent.

The A horizon has hue of 2.5Y or 10YR, value of 3 to 5, and chroma of 1 to 3. The E horizon has hue of 2.5Y or 10YR, value of 5 to 7, and chroma of 3 to 8. It is loamy sand or loamy coarse sand.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. The number of mottles in shades of red or brown ranges from none to common. The texture is sandy loam or sandy clay loam.

The Btx horizon has the same colors as the Bt horizon or is mottled in shades of brown, red, or yellow. In some pedons it has gray mottles in the lower part. Brittle, hard platy peds, which commonly are red, make up as much as 30 percent of the horizon, by volume. The texture is sandy clay loam or sandy loam.

The C horizon dominantly has hue of 2.5YR to 10YR, value of 4 to 7, and chroma of 4 to 8 and has mottles in shades of gray, brown, or red. In some pedons, however, it is mottled in shades of yellow, gray, brown, or red. Brittle, hard platy peds, which commonly are red, make up 5 to 15 percent of the horizon, by volume. The texture is sandy loam, coarse sandy clay loam, or sandy clay loam.

Appling Series

The Appling series consists of very deep, well drained, moderately permeable soils on ridges and side slopes in the uplands. These soils formed in material weathered from felsic crystalline rocks (fig. 11). Slopes range from 2 to 15 percent. The soils are clayey, kaolinitic, thermic Typic Kanhapludults.

Appling soils are commonly associated with Cecil, Colfax, Helena, and Pacolet soils. The well drained Cecil soils are in landscape positions similar to those of the Appling soils. They have a red subsoil. The somewhat poorly drained Colfax soils are in the lower positions. They have a fragipan. The moderately well drained Helena soils have mixed mineralogy. The well drained Pacolet soils have a Bt horizon that is thinner than that of the Appling soil and have a red subsoil.

Typical pedon of Appling sandy loam, 2 to 8 percent slopes, about 1.8 miles west of Wesley Chapel on North Carolina Highway 84, about 2.2 miles north on Secondary Road 1338 to its intersection with Secondary Road 1358, about 250 feet northwest of the intersection, in a cultivated field; USGS Matthews topographic quadrangle; lat. 35 degrees 03 minutes 18

seconds N. and long. 80 degrees 43 minutes 25 seconds W.

Ap—0 to 6 inches; brown (10YR 5/3) sandy loam; weak medium granular structure; very friable; common medium pores; common fine roots; about 10 percent angular quartz pebbles; slightly acid; clear smooth boundary.

E—6 to 9 inches; light yellowish brown (10YR 6/4) sandy loam; weak medium granular structure; very friable; common medium pores; common fine roots; about 5 percent angular quartz pebbles; slightly acid; clear smooth boundary.

BE—9 to 12 inches; yellowish brown (10YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; strongly acid; gradual wavy boundary.

Bt—12 to 48 inches; strong brown (7.5YR 5/6) clay; common medium distinct yellowish brown (10YR 5/6) and prominent red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; common medium pores; strongly acid; gradual wavy boundary.

BC—48 to 53 inches; mottled red (2.5YR 4/8) and brownish yellow (10YR 6/8) sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine and medium roots; few medium pores; few bodies of saprolite; strongly acid; gradual wavy boundary.

C—53 to 66 inches; multicolored sandy clay loam that weathered from saprolite; friable; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The depth to bedrock is more than 72 inches. Reaction is very strongly acid or strongly acid throughout the profile, except where the surface layer has been limed. The content of rock fragments, which are mainly quartz pebbles, ranges from 0 to 15 percent in the A horizon and from 0 to 5 percent in the B horizon.

The A or Ap horizon has hue of 5YR to 2.5Y, value of 3 to 6, and chroma of 2 to 6. It is loamy sand or sandy loam.

The E horizon, if it occurs, has hue of 5YR to 2.5Y and value and chroma of 4 to 6. It is sandy loam or loamy sand.

The BA or BE horizon, if it occurs, has hue of 5YR to 10YR, value of 5 or 6, and chroma of 4 to 8. It is sandy loam or sandy clay loam.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 6 to 8. Where hue is 5YR, patterns of mottling are evident in some part of the horizon. The number of mottles in shades of red, yellow, or brown ranges from few to many. The texture is dominantly sandy clay, clay loam, or clay. In some pedons, however, the horizon has thin layers of sandy clay loam.

The BC horizon commonly has colors similar to those of the Bt horizon. In some pedons it is mottled in shades of these colors. It is sandy clay loam or clay loam.

The C horizon is multicolored material that weathered from saprolite derived from felsic crystalline rock. The texture varies, but commonly is sandy loam, loam, clay loam, or sandy clay loam.

Badin Series

The Badin series consists of moderately deep, well drained, moderately permeable soils on ridges and side slopes in the uplands. These soils formed in material weathered from Carolina Slates (fig. 12). Slopes range from 2 to 45 percent. The soils are clayey, mixed, thermic Typic Hapludults.

Badin soils are commonly associated with Cid, Georgeville, Goldston, Misenheimer, Secrest, and Tatum soils. The moderately well drained and somewhat poorly drained Cid soils and the somewhat poorly drained Secrest soils are in the lower landscape positions. The well drained Georgeville soils are very deep and have kaolinitic mineralogy. The well drained to excessively drained Goldston soils are shallow and are in areas of highly dissected topography. The moderately well drained and somewhat poorly drained Misenheimer soils are shallow. The well drained Tatum soils are deep.

Typical pedon of Badin channery silty clay loam, 2 to 8 percent slopes, eroded, about 1.1 miles northwest of Wingate on Secondary Road 1761, about 40 feet south of the road, in a cultivated field; USGS Wingate topographic quadrangle; lat. 34 degrees 59 minutes 22 seconds N. and long. 80 degrees 27 minutes 54 seconds W.

Ap—0 to 6 inches; reddish brown (5YR 5/4) channery silty clay loam; weak medium granular structure; friable; many fine roots; about 20 percent slate channers; moderately acid; clear wavy boundary.

Bt—6 to 20 inches; red (2.5YR 4/8) silty clay; moderate medium subangular blocky structure; firm, sticky and plastic; few fine roots; common distinct clay films on faces of peds; about 15 percent slate channers; strongly acid; clear irregular boundary.

BC—20 to 29 inches; red (2.5YR 4/8) channery silty clay loam; common medium prominent yellow (10YR 7/6) and few medium prominent strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; few fine roots;

few distinct clay films on faces of peds; about 30 percent soft slate channers; very strongly acid; clear irregular boundary.

Cr—29 to 41 inches; weathered, fractured slate that can be dug with hand tools; common thin seams of silt loam in cracks 10 to 15 inches apart between rocks; abrupt smooth boundary.

R—41 inches; hard, fractured slate bedrock.

The thickness of the solum and the depth to soft, weathered bedrock range from 20 to 40 inches. The depth to hard bedrock is 40 inches or more. Reaction ranges from strongly acid to extremely acid throughout the solum, except where the surface has been limed. The content of coarse fragments ranges from 15 to 35 percent in the A horizon, from 5 to 30 percent in the Bt horizon, and from 20 to 60 percent in the BC horizon.

The A or Ap horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 to 8. It is channery silt loam or channery silty clay loam.

The BA horizon, if it occurs, has hue of 10YR to 5YR, value of 4 to 6, and chroma of 2 to 6. It is channery silt loam or channery silty clay loam.

The Bt horizon has hue of 7.5YR to 2.5YR, value of 4 to 6, and chroma of 4 to 8. It is silty clay, silty clay loam, channery silty clay, or channery silty clay loam.

The BC horizon commonly has colors similar to those of the Bt horizon. In some pedons it is mottled in shades of those colors. It is channery or very channery silty clay loam or channery or very channery silt loam.

The Cr horizon is fractured slate. It can be dug with difficulty with a spade. Thin seams of silty or loamy material are commonly in cracks between rocks.

The R layer is hard, fractured slate bedrock.

Cecil Series

The Cecil series consists of very deep, well drained, moderately permeable soils on ridges and side slopes in the uplands. These soils formed in material weathered from felsic crystalline rocks (fig. 13). Slopes range from 2 to 15 percent. The soils are clayey, kaolinitic, thermic Typic Kanhapludults.

Cecil soils are commonly associated with Appling, Gaston, Helena, Georgeville, Mecklenburg, Tatum, and Pacolet soils. The subsoil of the well drained Appling soils dominantly has hue of 7.5YR or yellower or has evident patterns of mottling where hue is 5YR. The well drained Gaston and Mecklenburg soils have mixed mineralogy. Also, Gaston soils have value of less than 4 in the subsoil. The moderately well drained Helena soils are on the lower parts of the landscape. The well drained Georgeville and Tatum soils have more than 30 percent silt in the particle-size control section. Also, Tatum soils have mixed mineralogy. The well drained Pacolet soils have a thinner solum than that of the Cecil soil.

Typical pedon of Cecil gravelly sandy clay loam, 2 to 8 percent slopes, eroded, about 0.25 mile south on Secondary Road 1106 from its intersection with Secondary Road 1104, about 20 feet east of the road, in a pine forest; USGS Van Wyck topographic quadrangle; lat. 34 degrees 52 minutes 01 second N. and long. 80 degrees 46 minutes 12 seconds W.

Ap—0 to 6 inches; yellowish red (5YR 4/6) gravelly sandy clay loam; moderate medium granular structure; friable; many fine roots; about 15 percent angular quartz pebbles; moderately acid; clear smooth boundary.

Bt—6 to 47 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm, sticky and plastic; common distinct clay films on faces of peds; few fine roots; few fine pores; few fine flakes of mica; few quartz pebbles; strongly acid; gradual wavy boundary.

BC—47 to 54 inches; red (2.5YR 4/6) clay loam; common medium prominent reddish yellow (7.5YR 6/8) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; few fine pores; common fine flakes of mica; about 20 percent loam that weathered from saprolite; strongly acid; gradual wavy boundary.

C—54 to 72 inches; red (2.5YR 5/6) loam that weathered from saprolite; many medium prominent reddish yellow (7.5YR 6/8) mottles; massive; friable; common fine flakes of mica; strongly acid.

The thickness of the solum ranges from 40 to more than 60 inches. The depth to bedrock is more than 60 inches. Reaction is very strongly acid to moderately acid in the A horizon, except where the surface layer has been limed, and is strongly acid or very strongly acid in the B and C horizons. The content of gravel ranges from 15 to 25 percent in the A horizon and from 0 to 5 percent in the Bt horizon. Most pedons have few or common flakes of mica in the BC and C horizons.

The Ap horizon has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 4 to 6.

The Bt dominantly has hue of 2.5YR, value of 4 or 5, and chroma of 6 to 8. Where patterns of mottling are not evident, it has hue of 2.5YR or 5YR. It is clay loam or clay.

The BC horizon has hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8. In most pedons it has mottles in shades of yellow or brown. It is sandy clay loam or clay loam.

The C horizon is multicolored or has shades of red or

brown. It is saprolite that weathered from felsic crystalline rock. The texture varies, but commonly is sandy loam, loam, clay loam, or sandy clay loam.

Chewacla Series

The Chewacla series consists of very deep, somewhat poorly drained, moderately permeable soils on flood plains. These soils formed in loamy sediments washed largely from soil material weathered from felsic or mafic crystalline rocks and slate rocks. They are very deep over bedrock. Slopes range from 0 to 2 percent. The soils are fine loamy, mixed, thermic Fluvaquentic Dystrochrepts.

Chewacla soils are commonly associated with Badin, Cecil, Cid, Goldston, Pacolet, Secrest, and Tatum soils. These associated soils are on adjoining uplands.

Typical pedon of Chewacla silt loam, 0 to 2 percent slopes, frequently flooded, about 2.5 miles west of Benton Crossroads on Secondary Road 1004, about 0.8 mile north on Secondary Road 1533 to Goose Creek, 50 feet west of the road, 225 feet south of the creek, in a cultivated field; USGS Bakers topographic quadrangle; lat. 35 degrees 07 minutes 24 seconds N. and long. 80 degrees 34 minutes 41 seconds W.

Ap—0 to 7 inches; brown (10YR 5/3) silt loam; moderate medium granular structure; very friable; many fine roots; slightly acid; clear smooth boundary.

Bw1—7 to 18 inches; light yellowish brown (10YR 6/4) silt loam; many medium distinct dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; friable; common fine roots; few fine flakes of mica; moderately acid; gradual wavy boundary.

Bw2—18 to 31 inches; yellowish brown (10YR 5/6) loam; common fine prominent light brownish gray (2.5Y 6/2) mottles; weak fine subangular blocky structure; friable, slightly sticky; few fine flakes of mica; strongly acid; gradual wavy boundary.

BCg—31 to 52 inches; light brownish gray (2.5Y 6/2) silty clay loam; many medium prominent yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; friable; slightly sticky; few fine flakes of mica; strongly acid; clear wavy boundary.

Cg—52 to 72 inches; light gray (2.5Y 7/2) loamy fine sand; common medium distinct yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) mottles; single grained; loose; few fine flakes of mica; moderately acid.

The thickness of the solum ranges from 40 to 60 inches. The depth to bedrock is more than 60 inches. Few or common flakes of mica are in some pedons. The content of rock fragments is less than 5 percent in the A and B horizons. Reaction ranges from very strongly acid to slightly acid in the A horizon and the upper part of the B horizon, except where surface layer has been limed. It ranges from very strongly acid to slightly alkaline in the lower part of the B horizon and in the C horizon. Few or common concretions are in some pedons.

The A or Ap horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 1 to 4. Where value is less than 4, the horizon is less than 7 inches thick.

The AB or BA horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 3 to 8. It is loam, silt loam, clay loam, or silty clay loam.

The Bw horizon has hue of 5YR to 2.5Y, value of 4 to 7, and chroma of 3 to 8. Mottles with chroma of 2 or less are within 24 inches of the surface. Mottles in shades of brown are common in the Bw horizon. The texture is sandy clay loam, fine sandy loam, loam, or clay loam. Individual subhorizons are silt loam or silty clay loam.

The Bg horizon, if it occurs, commonly has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. In some pedons, however, it is neutral and has value of 4 to 7. It is sandy clay loam, fine sandy loam, loam, or clay loam. Individual subhorizons are silt loam or silty clay loam.

The C horizon, if it occurs, has hue of 5YR to 2.5Y, value of 4 to 7, and chroma of 2 to 8. It has mottles in shades of brown or gray. To a depth of 40 inches, it is sandy clay loam, fine sandy loam, loam, clay loam, silt loam, or silty clay loam. Below a depth of 40 inches, the texture varies, ranging from extremely gravelly sand to clay.

The Cg horizon commonly has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. In some pedons, however, it is neutral and has value of 4 to 7. It has mottles in shades of brown or gray. To a depth of 40 inches, it is sandy clay loam, fine sandy loam, loam, clay loam, silt loam, or silty clay loam. Below a depth of 40 inches, the texture varies, ranging from extremely gravelly sand to clay.

Cid Series

The Cid series consists of moderately deep, moderately well drained and somewhat poorly drained, slowly permeable soils on flats in the uplands. These soils formed in material weathered from Carolina Slates. Slopes range from 1 to 5 percent. The soils are clayey, mixed, thermic Aquic Hapludults.

Cid soils are commonly associated with Badin, Georgeville, Goldston, Misenheimer, Secrest, and Tatum soils. The well drained Badin, Georgeville, and

Tatum soils are in the higher landscape positions. The well drained to excessively drained Goldston soils are shallow and are in the higher landscape positions. The moderately well drained and somewhat poorly drained Misenheimer soils are shallow. The moderately well drained Secrest soils are deep over bedrock.

Typical pedon of Cid channery silt loam, 1 to 5 percent slopes, about 1.2 miles south on Secondary Road 1349 from the Monroe Airport, 10 feet west of the road in a wooded area; USGS Matthews topographic quadrangle; lat. 35 degrees 00 minutes 49 seconds N. and long. 80 degrees 37 minutes 58 seconds W.

Oi—2 inches to 0; partially decomposed forest litter.

A—0 to 4 inches; light brownish gray (10YR 6/2) channery silt loam; weak medium granular structure; very friable; many fine and medium roots; about 20 percent slate channers; strongly acid; gradual wavy boundary.

E—4 to 9 inches; pale yellow (2.5Y 7/4) channery silt loam; weak medium granular structure; friable; common fine and medium roots; common fine pores; about 15 percent slate channers; very strongly acid; gradual wavy boundary.

Bt1—9 to 16 inches; brownish yellow (10YR 6/6) silty clay loam; common medium distinct pale yellow (2.5Y 7/4) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few faint clay films on faces of peds; about 5 percent slate channers; few fine and medium roots; common fine pores; very strongly acid; gradually wavy boundary.

Bt2—16 to 22 inches; light olive brown (2.5Y 5/4) silty clay; common medium distinct light brownish gray (10YR 6/2) mottles; moderate medium angular blocky structure; firm, sticky and slightly plastic; few fine and medium roots; common fine pores; common distinct clay films on faces of peds; about 5 percent slate channers; very strongly acid; gradual wavy boundary.

BC—22 to 27 inches; mottled grayish brown (10YR 5/2) and light olive brown (2.5Y 5/4) channery silty clay; weak medium subangular blocky structure; firm, sticky and slightly plastic; few fine and medium roots; about 20 percent slate channers; very strongly acid; gradual wavy boundary.

Cr—27 to 32 inches; weathered, fractured slate bedrock that can be dug with difficulty with hand tools; thin seams of grayish brown (10YR 5/2) silt loam in vertical cracks 10 inches apart; abrupt smooth boundary.

R—32 inches; hard, fractured slate bedrock.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. Reaction ranges from extremely acid to strongly acid, except where the surface layer has been limed. The content of rock fragments ranges from 15 to 30 percent in the A horizon, from 0 to 15 percent in the Bt horizon, and from 10 to 35 percent in the BC horizon.

The A or Ap horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 to 4. The E horizon has hue of 10YR to 5Y, value of 6 or 7, and chroma of 2 to 4. It is silt loam, loam, or very fine sandy loam.

The Bt horizon commonly has hue of 10YR to 5Y, value of 5 to 7, and chroma of 3 to 8. In some pedons it has mottles in shades of these colors. The upper 24 inches of the horizon has mottles with chroma of 2 or less. The texture is silty clay loam, silty clay, or clay.

The BC horizon commonly has hue of 10YR to 5Y, value of 5 to 7, and chroma of 3 to 8. In some pedons it has mottles in shades of these colors. It is silty clay, silty clay loam, clay, channery silty clay, or channery silty clay loam.

The BCg horizon, if it occurs, dominantly has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. In some pedons, however, it is neutral and has value of 5 to 7. It is silty clay, silty clay loam, clay, channery silty clay, or channery silty clay loam.

The Cr horizon is multicolored, weathered and fractured slate bedrock that can be dug with difficulty with a spade.

The R layer is hard, fractured slate, argillite, or other fine grained metamorphic rock.

Colfax Series

The Colfax series consists of deep, somewhat poorly drained soils in the uplands. These soils formed in material weathered from felsic crystalline rocks. Permeability is moderate in the upper part of the subsoil and slow in the fragipan. Slopes range from 0 to 3 percent. The soils are fine-loamy, mixed, thermic Aquic Fragiudults.

Colfax soils are commonly associated with Appling and Helena soils. The well drained Appling soils are in the higher landscape positions. The moderately well drained Helena soils have more than 35 percent clay in the particle-size control section.

Typical pedon of Colfax sandy loam, 0 to 3 percent slopes, about 0.75 mile west of Marvin on Secondary Road 1315 to a private road, 300 feet southwest of the road in an old field; USGS Catawba NE topographic quadrangle; lat. 34 degrees 59 minutes 43 seconds N. and long. 80 degrees 51 minutes 38 seconds W.

Ap—0 to 7 inches; light brownish gray (10YR 6/2) sandy loam; weak medium granular structure; very friable; common fine roots; common medium pores; moderately acid; abrupt smooth boundary.

E—7 to 14 inches; light gray (10YR 7/2) sandy loam; weak fine granular structure; very friable; common fine roots; common medium pores; strongly acid; clear smooth boundary.

Bt1—14 to 22 inches; brownish yellow (10YR 6/6) sandy clay loam; common medium faint gray (10YR 6/1) mottles; weak medium subangular blocky structure; friable; few faint clay films on faces of peds; common fine and medium roots; common medium pores; strongly acid; clear wavy boundary.

Bt2—22 to 29 inches; mottled brownish yellow (10YR 6/8) and gray (10YR 6/1) sandy clay loam; moderate medium subangular blocky structure; friable; common distinct clay films on faces of peds; common fine and medium roots; common medium pores; strongly acid; clear wavy boundary.

Btx—29 to 48 inches; brownish yellow (10YR 6/8) sandy loam; many medium prominent light gray (10YR 7/1) and few medium faint strong brown (7.5YR 5/6) mottles; weak very coarse prismatic structure parting to moderate coarse subangular blocky; very firm, brittle; few distinct clay films; few medium pockets of sandy clay loam; strongly acid; gradual smooth boundary.

C—48 to 59 inches; light gray (2.5Y 7/2) sandy loam that weathered from saprolite; common medium distinct very pale brown (10YR 8/4) and brownish yellow (10YR 6/8) mottles; massive; weak relict rock structure; friable; few medium fragments of weathered granite; very strongly acid; gradual wavy boundary.

Cr—59 to 65 inches; weathered granite that can be dug with hand tools; abrupt smooth boundary.

R—65 inches; hard granite.

The thickness of the solum ranges from 30 to more than 60 inches. The depth to a fragipan is 16 to 36 inches. The depth to weathered bedrock is 40 to 60 inches. The depth to hard bedrock is more than 60 inches. The content of rock fragments, which are mostly pebbles, ranges from 0 to 10 percent in the A and B horizons. The pebbles commonly are quartz or granite. Reaction ranges from extremely acid to strongly acid, except where the surface layer has been limed.

The Ap or A horizon dominantly has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 to 4. In some pedons, however, it is neutral and has value of 4 to 6.

The E horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 2 to 4. It is sandy loam or fine sandy loam.

The BE horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 4 to 8. It is sandy clay loam, clay loam, or loam.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 4 to 8. It commonly has mottles with chroma of 2 or less. In some pedons it has higher chroma mottles. It is sandy clay loam, clay loam, or loam.

The Btx horizon has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 4 to 8. It has mottles with hue of 7.5YR to 5Y, value of 5 to 8, and chroma of 1 to 8. It is fine sandy loam, sandy loam, sandy clay loam, clay loam, or loam.

The BC horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 2 to 6. It is fine sandy loam, sandy loam, sandy clay loam, clay loam, or loam.

The C horizon has hue of 2.5YR to 5Y, value of 2 to 8, and chroma of 1 to 8. It is dominantly sandy loam or sandy clay loam. In some pedons, however, it has a large proportion of highly weathered, soft rock fragments.

The Cr horizon is weathered bedrock that can be dug with hand tools.

The R layer is hard granite.

Creedmoor Series

The Creedmoor series consists of very deep, moderately well drained and somewhat poorly drained, very slowly permeable soils in the uplands. These soils formed in material weathered from Triassic rocks, such as sandstone and siltstone. Slopes range from 2 to 8 percent. The soils are clayey, mixed, thermic Aquic Hapludults.

Creedmoor soils are commonly associated with Badin, Chewacla, Goldston, and White Store soils. The well drained Badin soils are in the higher landscape positions. They formed in material weathered from slate and are moderately deep. The somewhat poorly drained Chewacla soils are on flood plains. The well drained to excessively drained Goldston soils are shallow and are on side slopes. The moderately well drained White Store soils are Alfisols.

Typical pedon of Creedmoor loam, 2 to 8 percent slopes, about 150 feet from the intersection of Canal Road and Zion Church Road on Canal Road, 10 feet north of the road in a cultivated field; USGS Hornsboro topographic quadrangle; lat. 34 degrees 50 minutes 18 seconds N. and long. 80 degrees 21 minutes 29 seconds W.

Ap—0 to 7 inches; yellowish brown (10YR 5/4) loam; weak medium granular structure; very friable; common fine roots; slightly acid; clear smooth boundary.

E—7 to 10 inches; very pale brown (10YR 7/4) loam; weak medium granular structure; very friable;

common fine roots; slightly acid; clear smooth boundary.

Bt1—10 to 21 inches; brownish yellow (10YR 6/6) sandy clay loam; common medium distinct very pale brown (10YR 7/4) mottles; weak medium subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt2—21 to 32 inches; yellowish brown (10YR 5/8) clay; common medium distinct light gray (10YR 7/1) mottles; moderate medium angular blocky structure; firm, sticky and very plastic; few fine and medium roots; common prominent clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bt3—32 to 41 inches; yellowish brown (10YR 5/8) clay; many coarse prominent light gray (10YR 7/1) mottles; coarse medium angular blocky structure; very firm, very sticky and very plastic; few medium roots; common prominent clay films on faces of peds; very strongly acid; gradual wavy boundary.

BC—41 to 50 inches; mottled light gray (10YR 7/1), yellowish brown (10YR 5/8), and yellowish red (5YR 4/6) clay loam; weak medium angular blocky structure; firm, sticky and plastic; few distinct clay films on faces of peds; very strongly acid; gradual wavy boundary.

C—50 to 56 inches; dark reddish brown (2.5YR 3/4) sandy clay loam; massive; friable; common soft sandstone fragments; very strongly acid; gradual wavy boundary.

Cr—56 to 62 inches; weathered, fine grained sandstone that can be dug with hand tools; abrupt smooth boundary.

R—62 inches; hard sandstone.

The thickness of the solum ranges from 40 to 60 inches. The depth to hard bedrock is more than 60 inches. Reaction is strongly acid to extremely acid, except where the surface layer has been limed.

The A or Ap horizon has hue of 7.5YR to 2.5Y, value of 3 to 6, and chroma of 1 to 6. The E horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, chroma of 2 to 4. It is silty clay loam, silt loam, fine sandy loam, loam, or sandy loam.

The BE horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5 to 7, chroma of 4 to 6. It is sandy loam, sandy clay loam, loam, or silt loam.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 3 to 8. In some pedons, it is mottled or has mottles in shades of red, yellow, brown, or gray. Gray mottles are in the upper 24 inches of the horizon. The texture is sandy clay loam, clay loam, sandy clay, or clay.

The Btg horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 1 or 2. It has mottles in shades of red, yellow, or brown. It is sandy clay loam, silty clay loam, clay loam, sandy clay, clay, or silty clay.

The BC horizon has hue of 2.5YR to 2.5Y, value of 4 to 8, and chroma of 3 to 8. It has mottles in shades of red, yellow, brown, or gray. It is silty clay loam, sandy clay loam, or clay loam.

The BCg horizon, if it occurs, has hue of 2.5YR to 2.5Y, value of 4 to 8, and chroma of 1 or 2. It has mottles in shades of red, yellow, brown, or gray. It is silty clay loam, sandy clay loam, or clay loam.

The C horizon has hue of 10R to 2.5Y, value of 3 to 8, and chroma of 3 to 8. It is saprolite that weathered from Triassic rocks. It is silty clay loam, silt loam, loam, clay loam, sandy clay loam, fine sandy loam, or sandy loam.

The Cg horizon, if it occurs, has hue of 10R to 2.5Y, value of 3 to 8, and chroma of 1 to 8, or it is variegated red, white, gray, and brown. It is saprolite that weathered from Triassic rocks. It is silty clay loam, silt loam, loam, clay loam, sandy clay loam, fine sandy loam, or sandy loam.

The Cr horizon is weathered Triassic rock that can be dug with hand tools.

The R layer is hard Triassic rock.

Gaston Series

The Gaston series consists of very deep, well drained, moderately permeable soils on ridges and side slopes in the uplands. These soils formed in material weathered from mixed felsic and mafic crystalline rocks. Slopes range from 2 to 15 percent. The soils are clayey, mixed, thermic Humic Hapludults.

Gaston soils are commonly associated with Cecil, Iredell, and Mecklenburg soils. The well drained Cecil soils have kaolinitic mineralogy. The moderately well drained and somewhat poorly drained Iredell soils have montmorillonitic mineralogy and are on the lower parts of the landscape. The well drained Mecklenburg soils are Alfisols.

Typical pedon of Gaston clay loam, 2 to 8 percent slopes, eroded, about 0.75 mile south of Weddington on North Carolina Highway 16, about 0.7 mile west on Secondary Road 1316 to Secondary Road 1384, about 150 feet southwest of the road in a cultivated field; USGS Weddington topographic quadrangle; lat. 35 degrees 01 minute 04 seconds N. and long. 80 degrees 47 minutes 33 seconds W.

Ap—0 to 7 inches; dark reddish brown (5YR 3/4) clay loam; moderate medium granular structure; friable; many fine roots; few fine dark concretions; slightly acid; abrupt smooth boundary.

Bt1—7 to 19 inches; dark red (2.5YR 3/6) clay; moderate medium subangular blocky structure; firm, sticky and plastic; common distinct clay films on faces of peds; few medium roots; few fine pores; few fine dark concretions; moderately acid; gradual wavy boundary.

Bt2—19 to 52 inches; red (2.5YR 4/6) clay; few medium prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; common distinct clay films on faces of peds; few fine and medium roots; few fine pores; few fine dark concretions; moderately acid; gradual wavy boundary.

BC—52 to 59 inches; red (2.5YR 4/6) clay loam; many medium prominent brownish yellow (10YR 5/6) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few medium roots; moderately acid; gradual wavy boundary.

C—59 to 96 inches; multicolored loam that weathered from saprolite; strongly acid.

The thickness of the solum ranges from 40 to more than 60 inches. The depth to bedrock is more than 60 inches. Reaction ranges from strongly acid to slightly acid, except where the surface layer has been limed. Most pedons have few or common flakes of mica in the BC and C horizons.

The A or Ap horizon has hue of 2.5YR to 7.5YR, value of 2 or 3, and chroma of 3 to 6. The A horizon, if it occurs, is at least 6 inches thick.

The Bt horizon has hue of 10R or 2.5YR, value of 3 or 4, and chroma of 4 to 8. In some pedons it has high-chroma mottles or dark streaks or stains. It is clay or clay loam.

The BC horizon has hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8. In most pedons it has high-chroma mottles. In some pedons it has dark streaks or stains. It is clay loam, sandy clay loam, or loam.

The C horizon commonly is in shades of red, yellow, and brown. It is saprolite that weathered from mixed felsic and mafic crystalline rocks. The texture varies, but commonly is silt loam, loam, sandy loam, clay loam, or sandy clay loam.

Georgeville Series

The Georgeville series consists of very deep, well drained, moderately permeable soils on ridges in the uplands. These soils formed in material weathered from fine grained metamorphic rocks. Slopes range from 2 to 8 percent. The soils are clayey, kaolinitic, thermic Typic Hapludults.

Georgeville soils are commonly associated with Badin, Cecil, Goldston, Secrest, and Tatum soils. The well drained Badin soils have mixed mineralogy. They are in areas of more undulating topography than the Georgeville soils. The well drained Cecil soils have less than 30 percent silt in the control section. The well drained to excessively drained Goldston soils are shallow. They are on hilly topography. The moderately well drained Secrest soils are on the lower parts of the landscape. The well drained Tatum soils have mixed mineralogy.

Typical pedon of Georgeville silty clay loam, 2 to 8 percent slopes, eroded, about 2.0 miles east of Waxhaw on North Carolina Highway 75, about 0.3 mile north on Secondary Road 1326, about 50 feet west of the road in a cultivated field; USGS Waxhaw topographic quadrangle; lat. 34 degrees 56 minutes 04 seconds N. and long. 80 degrees 42 minutes 31 seconds W.

Ap—0 to 7 inches; reddish brown (5YR 5/4) silty clay loam; weak medium granular structure; very friable; common fine roots; common fine and medium pores; about 5 percent angular quartz pebbles; moderately acid; abrupt smooth boundary.

Bt1—7 to 37 inches; red (2.5YR 4/6) clay; strong fine and medium angular blocky structure; firm, sticky and plastic; common distinct clay films on faces of peds; few fine roots; few fine and medium pores; strongly acid; gradual wavy boundary.

Bt2—37 to 50 inches; red (2.5YR 4/6) silty clay; few fine prominent strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; common distinct clay films on faces of peds; few fine roots; few fine pores; strongly acid; gradual wavy boundary.

BC—50 to 60 inches; red (2.5YR 4/8) silty clay loam; common medium prominent reddish yellow (7.5YR 6/6) mottles; weak medium subangular blocky structure; friable; few fine roots; few fine pores; few medium soft multicolored slate fragments; strongly acid; gradual irregular boundary.

C—60 to 84 inches; weak red (10R 4/4) silt loam that weathered from saprolite; common streaks of yellow (10YR 7/6) and strong brown (7.5YR 5/8) silty clay loam material; weak thick platy relict rock structure; few fine roots; strongly acid.

The thickness of the solum ranges from 40 to more than 60 inches (fig. 14). The depth to bedrock is more than 60 inches. Reaction is very strongly acid or strongly acid throughout the profile, except where the surface layer has been limed. The content of rock fragments ranges from 0 to 15 percent in the A horizon and from 0 to 10 percent in the B and C horizons.

The A horizon dominantly has hue of 5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 8. In eroded areas,

Figure 11.—An area of an Appling soil. Appling soils have a brown subsoil and are very deep to felsic crystalline bedrock.

Figure 12.—Profile of a Badin soil. Badin soils are underlain by Carolina Slates at a depth of 20 to 40 inches. Depth is marked in inches.

Figure 13.—Profile of a Cecil soil. Cecil soils are very deep and have a red subsoil that weathered from felsic crystalline rocks. Depth is marked in inches.

Figure 14.—Profile of a Georgeville soil. Georgeville soils have a thick, clayey subsoil that extends from a depth of 40 inches to more than 60 inches. Depth is marked in inches.

Figure 15.—Profile of a Pacolet soil. Pacolet soils have a thin, clayey subsoil that extends to a depth of less than 40 inches. Below the subsoil is multicolored saprolite. Depth is marked in feet.

Figure 16.—Profile of a Zion soil. Zion soils have a slowly permeable, clayey subsoil. Hard bedrock is at a depth of 20 to 40 inches. Depth is marked in feet.

however, it has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8. It is silt loam or silty clay loam.

The Bt horizon has hue of 10R to 5YR, value of 4 or 5, and chroma of 6 to 8. In most pedons, it has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 to 8 in the upper part and has mottles in shades of yellow or brown in the lower part. It is commonly clay or silty clay but ranges to clay loam or silty clay loam.

The BC horizon has hue of 10R to 5YR, value of 4 or 5, and chroma of 6 to 8. It has mottles in shades of yellow or brown. It is silt loam, loam, silty clay loam, or clay loam.

The C horizon has hue of 10R to 10YR, value of 4 to 6, and chroma of 3 to 8. It has mottles in shades of brown, yellow, gray, or red. It is silt loam or loam.

Goldston Series

The Goldston series consists of shallow, well drained to excessively drained, moderately rapidly permeable soils on ridges and side slopes in the uplands. These soils formed in material weathered from Carolina Slates. Slopes range from 4 to 45 percent. The soils are loamy-skeletal, siliceous, thermic, shallow Typic Dystrochrepts.

Goldston soils are commonly associated with Badin, Cid, Georgeville, Misenheimer, Secrest, and Tatum soils. The well drained Badin, Georgeville, and Tatum soils have a Bt horizon. They are in areas of less dissected topography than the Goldston soils. The moderately well drained and somewhat poorly drained Cid soils, the moderately well drained Secrest soils, and the moderately well drained and somewhat poorly drained Misenheimer soils are on the lower parts of the landscape.

Typical pedon of Goldston very channery silt loam, 4 to 15 percent slopes, about 0.7 mile south of Marshville on Secondary Road 1005, about 2.0 miles east on Secondary Road 1901, about 300 feet northwest from an equipment entrance, in a cultivated field; USGS Marshville topographic quadrangle; lat. 34 degrees 58 minutes 25 seconds N. and long. 80 degrees 19 minutes 32 seconds W.

Ap—0 to 5 inches; brown (10YR 5/3) very channery silt loam; weak medium granular structure; very friable; many fine and medium roots; few medium pores; about 45 percent slate channers; slightly acid; abrupt smooth boundary.

Bw—5 to 16 inches; light yellowish brown (2.5Y 6/4) very channery silt loam; weak fine subangular blocky structure; very friable; common fine and medium roots; few medium pores; about 50 percent slate channers; strongly acid; gradual irregular boundary.

Cr—16 to 27 inches; weathered, fractured slate that can be dug with difficulty with hand tools; few seams of pale yellow (2.5Y 7/4) silt loam in cracks more than 10 inches apart; abrupt smooth boundary.

R—27 inches; hard, fractured slate bedrock.

The thickness of the solum and the depth to weathered, highly fractured slate bedrock range from 10 to 20 inches. The depth to hard, fractured bedrock is 20 to 40 inches. Reaction ranges from extremely acid to strongly acid, except where the surface layer has been limed. The content of rock fragments, which are 0.25 inch to 6 inches in length, ranges from 15 to 60 percent in the A horizon, from 35 to 70 percent in the B horizon, from 35 to 60 percent in the C horizon, and from 15 to 60 percent in the E horizon, if it occurs.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 4. The E horizon, if it occurs, has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 2 to 6. It is silt loam or very fine sandy loam in the fine-earth fraction.

The Bw horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 3 to 8. In some pedons it has mottles in shades of brown, yellow, or red. It is silt loam or very fine sandy loam in the fine-earth fraction.

The Cr horizon is weathered, fractured slate bedrock that can be dug with hand tools.

The R layer is slate bedrock.

Helena Series

The Helena series consists of very deep, moderately well drained, slowly permeable soils on broad ridges, on toe slopes, and at the head of intermittent drainageways. These soils formed in material weathered from mixed felsic and mafic crystalline rocks. Slopes range from 2 to 8 percent. The soils are clayey, mixed, thermic Aquic Hapludults.

Helena soils are commonly associated with Appling, Cecil, and Colfax soils. The well drained Appling and Cecil soils have kaolinitic mineralogy. The somewhat poorly drained Colfax soils have a fragipan.

Typical pedon of Helena fine sandy loam, 2 to 8 percent slopes, about 1.0 mile east of Marvin on Secondary Road 1315, about 25 feet south of the road, in a pine forest; USGS Catawba NE topographic quadrangle; lat. 34 degrees 59 minutes 30 seconds N. and long. 80 degrees 48 minutes 31 seconds W.

Oi—3 inches to 0; undecomposed pine forest litter.

Ap—0 to 6 inches; grayish brown (10YR 5/2) fine sandy loam; weak medium granular structure; very friable; few fine and medium roots; few angular quartz pebbles; moderately acid; clear smooth boundary.

E—6 to 8 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak medium granular structure; very friable; common fine and medium roots; few angular quartz pebbles; very strongly acid; clear smooth boundary.

Bt1—8 to 20 inches; yellowish brown (10YR 5/8) clay; common medium prominent red (2.5YR 4/8) mottles; moderate medium angular blocky structure; firm, sticky and plastic; common prominent clay films on faces of peds; few fine and medium roots; very strongly acid; gradual wavy boundary.

Bt2—20 to 32 inches; yellowish brown (10YR 5/8) clay; common medium distinct light gray (10YR 7/2) and few medium prominent red (2.5YR 4/8) mottles; moderate coarse angular blocky structure; very firm, sticky and very plastic; common prominent clay films on faces of peds; few fine and medium roots; very strongly acid; gradual wavy boundary.

BC—32 to 45 inches; mottled yellowish brown (10YR 5/8) and light gray (10YR 7/2) clay loam; weak medium angular blocky structure grading to massive; firm, sticky and plastic; few fine roots; very strongly acid; gradual wavy boundary.

C—45 to 72 inches; yellowish brown (10YR 5/8) sandy loam that weathered from saprolite; common medium distinct light gray (10YR 7/2) and red (2.5YR 4/8) mottles; massive; friable; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The depth to bedrock is more than 60 inches. Reaction is extremely acid to strongly acid, except where the surface layer has been limed. The content of rock fragments, which are mostly quartz pebbles, ranges from 0 to 10 percent.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 3 to 6, and chroma of 1 to 4. The E horizon has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 2 to 4. It is loamy sand, loamy coarse sand, coarse sandy loam, sandy loam, fine sandy loam, or loam.

The Bt horizon dominantly has hue of 7.5YR to 5Y, value of 5 to 8, and chroma of 3 to 8. In some pedons, however, the lower part of the horizon has hue of 5YR or is mottled in shades of yellow, brown, gray, or red. The upper 24 inches of the horizon has mottles with chroma of 2 or less. The texture is dominantly clay loam, sandy clay, or clay. In some pedons, however, the horizon has thin layers of sandy clay loam.

The Btg horizon, if it occurs, has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. It has mottles in shades of yellow, brown, gray, or red. It is dominantly clay loam, sandy clay, or clay. In some pedons, however, it has thin layers of sandy clay loam.

The BC horizon has hue of 7.5YR to 5Y, value of 5 to 8, and chroma of 3 to 8. It has mottles in shades of yellow, brown, gray, or red. It is clay loam, sandy clay loam, or sandy loam.

The C horizon has hue of 5YR to 5Y, value of 5 to 8, and chroma of 3 to 8. The texture varies, but commonly is sandy loam, fine sandy loam, loam, or sandy clay loam that weathered from saprolite. In some pedons the horizon has thin seams or layers of clay loam or clay.

The Cg horizon, if it occurs, has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. In most pedons it is mottled in shades of red or brown. The texture varies, but commonly is sandy loam, fine sandy loam, loam, or sandy clay loam that weathered from saprolite. In some pedons the horizon has thin seams or layers of clay loam or clay.

Iredell Series

The Iredell series consists of very deep, moderately well drained and somewhat poorly drained, slowly permeable soils on broad flats in the uplands, in depressions, and at the head of intermittent drainageways. These soils formed in material weathered from mafic crystalline rocks. Slopes range from 0 to 3 percent. The soils are fine, montmorillonitic, thermic Typic Hapludalfs.

Iredell soils are commonly associated with Chewacla, Gaston, Mecklenburg, and Zion soils. The somewhat poorly drained Chewacla soils are on flood plains. The well drained Gaston, Mecklenburg, and Zion soils have mixed mineralogy and are on the higher parts of the landscape.

Typical pedon of Iredell loam, 0 to 3 percent slopes, about 1.0 mile north of Marvin on Secondary Road 1316, about 0.75 mile northwest on Secondary Road 1313, about 600 feet south of the road, in a cultivated field; USGS Weddington topographic quadrangle; lat. 35 degrees 00 minutes 29 seconds N. and long. 80 degrees 48 minutes 43 seconds W.

Ap—0 to 8 inches; dark grayish brown (2.5Y 4/2) loam; moderate medium granular structure; friable; many fine roots; few pebbles; common black concretions; slightly acid; clear smooth boundary.

Bt1—8 to 25 inches; light olive brown (2.5Y 5/4) clay; strong coarse angular blocky structure; very firm, very sticky and very plastic; many prominent clay films on faces of peds; few fine roots; few fine pores; few black concretions; few pebbles; neutral; gradual wavy boundary.

Bt2—25 to 34 inches; mottled olive brown (2.5Y 4/4) and dark grayish brown (2.5Y 4/2) clay loam; moderate medium angular blocky structure; firm,

sticky and plastic; few fine roots; few black concretions; few seams of sandy loam that weathered from saprolite; neutral; gradual wavy boundary.

C—34 to 60 inches; multicolored sandy clay loam that weathered from saprolite; massive; relict rock structure; friable; few fine roots in cracks; common seams of sandy clay; mildly alkaline.

The thickness of the solum ranges from 20 to 40 inches. The depth to bedrock is more than 60 inches. Most pedons have few to many dark concretions throughout. Many have few to many dark mottles in the B and C horizons. The content of rock fragments, which are mostly quartz pebbles and diorite, ranges from 0 to 15 percent in the A horizon. Reaction ranges from strongly acid to neutral in the A horizon and from moderately acid to mildly alkaline in the B horizon.

The A or Ap horizon has hue of 10YR to 5Y, value of 4 or 5, and chroma of 2 to 4.

The upper part of the Bt horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 to 6. The lower part has hue of 10YR to 5Y, value of 4 to 6, and chroma of 2 to 6. It is commonly clay loam or clay. In some pedons, however, it has thin layers of loam.

The C horizon is saprolite in shades of white, gray, brown, yellow, or black. The texture varies, but commonly is sandy loam, sandy clay loam, or loam.

Mecklenburg Series

The Mecklenburg series consists of well drained, slowly permeable soils on ridges, knolls, and side slopes in the uplands. These soils formed in material weathered from mafic crystalline rocks. They are moderately deep to saprolite and very deep over bedrock. Slopes range from 2 to 8 percent. The soils are fine, mixed, thermic Ultic Hapludalfs.

Mecklenburg soils are commonly associated with Cecil, Gaston, and Iredell soils. The well drained Cecil soils have kaolinitic mineralogy. The well drained Gaston soils are Ultisols. The moderately well drained and somewhat poorly drained Iredell soils have montmorillonitic mineralogy and do not have hue of 5YR or redder in the subsoil.

Typical pedon of Mecklenburg sandy clay loam, 2 to 8 percent slopes, eroded, about 1.0 mile north of Marvin on Secondary Road 1316 to its intersection with Secondary Road 1313, about 750 feet west of the intersection in a cultivated field; USGS Weddington topographic quadrangle; lat. 35 degrees 00 minutes 14 seconds N. and long. 80 degrees 21 minutes 21 seconds W.

Ap—0 to 6 inches; reddish brown (5YR 4/4) sandy clay loam; weak medium granular structure; friable; many fine roots; few black concretions; few angular quartz pebbles; slightly acid; abrupt smooth boundary.

Bt1—6 to 18 inches; red (2.5YR 4/6) clay; moderate medium angular blocky structure; firm, sticky and plastic; common fine roots; common distinct clay films on faces of peds; common dark stains on faces of peds; few black concretions; slightly acid; gradual wavy boundary.

Bt2—18 to 34 inches; yellowish red (5YR 4/6) clay; common medium distinct red (2.5YR 4/6) and strong brown (7.5YR 5/6) mottles; moderate medium angular blocky structure; firm, sticky and plastic; few fine roots; common distinct clay films on faces of peds; few black concretions; slightly acid; gradual wavy boundary.

BC—34 to 40 inches; red (2.5YR 4/6) clay loam; common medium prominent yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm, slightly sticky and slightly plastic; few fine pores; neutral; gradual wavy boundary.

C—40 to 60 inches; multicolored silty clay loam that weathered from saprolite; common lenses of clayey material in upper part; massive; friable; neutral.

The thickness of the solum ranges from 20 to 58 inches. The depth to bedrock is more than 60 inches. Reaction is strongly acid to slightly acid in the A horizon, except where the surface layer has been limed, and is moderately acid to neutral in the B and C horizons. The content of rock fragments, which are mostly pebbles and cobbles, ranges from 0 to 15 percent in the A horizon and from 0 to 5 percent in the B horizon. Few to many manganese concretions are in the A and B horizons.

The Ap horizon has hue of 2.5YR or 5YR, value of 3 to 6, and chroma of 2 to 6. Where value is less than 4, the horizon is less than 6 inches thick.

The BE or BA horizon, if it occurs, has hue of 2.5YR or 5YR, value of 3 to 6, and chroma of 4 to 8. It is sandy clay loam or clay loam.

The Bt horizon has hue of 2.5YR or 5YR. In the upper part, it has value of 3 to 6 and chroma of 4 to 8. In the lower part, it has value of 4 to 6 and chroma of 4 to 8 and has mottles in shades of brown, yellow, or red.

The BC horizon commonly has hue of 2.5YR to 7.5YR, value of 4 to 7, and chroma of 4 to 8. In some pedons it has mottles in shades of these colors. It is loam, sandy clay loam, or clay loam.

The C horizon is multicolored saprolite that weathered from mafic crystalline rock. The texture varies, but commonly is silt loam, silty clay loam, or

loam. In most pedons the horizon has thin seams or lenses of clay in the upper part.

Misenheimer Series

The Misenheimer series consists of shallow, moderately well drained and somewhat poorly drained, moderately rapidly permeable soils on broad ridges in the uplands, in depressions, and at the head of intermittent drainageways. These soils formed in material weathered from Carolina Slates. Slopes range from 0 to 3 percent. The soils are loamy, siliceous, thermic, shallow Aquic Dystrochrepts.

Misenheimer soils are commonly associated with Badin, Cid, Goldston, Secrest, and Tatum soils. The well drained Badin soils are moderately deep and are on the higher parts of the landscape. Cid soils are moderately deep and have a clayey particle-size control section. The moderately well drained Secrest soils have a fine-silty particle-size control section. The well drained to excessively drained Goldston soils have a loamy-skeletal particle-size control section and are in areas of more rolling topography than the Misenhimer soils. The well drained Tatum soils are deep and are on the higher parts of the landscape.

Typical pedon of Misenheimer channery silt loam, in an area of Misenheimer-Cid complex, 0 to 3 percent slopes; about 0.75 mile south of Mineral Springs on Secondary Road 1111, about 0.9 mile east on Secondary Road 1147, about 900 feet north of the road in a cultivated field; USGS Waxhaw topographic quadrangle; lat. 34 degrees 55 minutes 51 seconds N. and long. 80 degrees 39 minutes 05 seconds W.

Ap—0 to 6 inches; grayish brown (10YR 5/3) channery silt loam; weak medium granular structure; very friable; many fine roots; about 25 percent slate fragments 0.25 to 1 inch in length; slightly acid; abrupt smooth boundary.

Bw—6 to 18 inches; pale yellow (2.5Y 7/4) channery silt loam; common medium faint light gray (2.5Y 7/2) mottles; weak medium subangular blocky structure; common fine roots in primary cracks; about 30 percent slate fragments 0.25 inch to 1.5 inches in length; very strongly acid; gradual irregular boundary.

Cr—18 to 24 inches; weathered, fractured slate bedrock that can be dug with hand tools; few seams of light brownish gray (2.5Y 7/2) silt loam in cracks 10 to 15 inches apart; clear irregular boundary.

R—24 inches; hard, fractured slate bedrock.

The thickness of the solum and the depth to weathered, fractured slate bedrock range from 10 to 20 inches. The depth to hard, fractured bedrock is 20 to 40 inches. Reaction ranges from extremely acid to strongly acid throughout the solum, except where the surface has been limed. The content of rock fragments ranges from 15 to 35 percent.

The Ap horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 to 4. The E horizon, if it occurs, has hue of 10YR to 5Y, value of 5 to 7, and chroma of 2 to 4. It is loam or silt loam in the fine-earth fraction.

The Bw horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 3 to 6. It is loam, silt loam, or silty clay loam in the fine-earth fraction. It has mottles with chroma of 2 or less throughout.

The C horizon, if it occurs, has hue of 10YR to 5Y, value of 5 to 7, and chroma of 3 to 6. It is silt loam in the fine-earth fraction.

The Cr horizon is weathered, fractured slate that can be dug with hand tools.

The R layer is hard, fractured slate bedrock.

Pacolet Series

The Pacolet series consists of very deep, well drained, moderately permeable soils on side slopes in the uplands. These soils formed in material weathered from felsic crystalline rocks. Slopes range from 4 to 40 percent. The soils are clayey, kaolinitic, thermic Typic Kanhapludults.

Pacolet soils are commonly associated with Appling, Cecil, and Gaston soils. These well drained associated soils have a clayey Bt horizon that is more than 24 inches thick and have a solum that is 40 or more inches thick.

Typical pedon of Pacolet sandy clay loam, 15 to 40 percent slopes, eroded, about 1.0 mile west of the Airport on Secondary Road 1194, about 1.5 miles south on Secondary Road 1106, about 150 feet east of the road in a forest; USGS Unity topographic quadrangle; lat. 34 degrees 50 minutes 38 seconds N. and long. 80 degrees 45 minutes 02 seconds W.

Oi—2 inches to 0; undecomposed forest litter.

A—0 to 5 inches; yellowish red (5YR 5/6) sandy clay loam; moderate medium granular structure; friable; many fine and medium roots; common fine and medium pores; about 10 percent quartz pebbles; strongly acid; clear wavy boundary.

Bt—5 to 26 inches; red (2.5YR 4/8) clay; moderate medium subangular blocky structure; firm, sticky and plastic; common distinct clay films on faces of peds; common fine and medium roots; few fine and medium pores; strongly acid; gradual wavy boundary.

BC—26 to 35 inches; red (2.5YR 5/8) sandy clay loam; common medium prominent reddish yellow (7.5YR 6/6) mottles; weak medium subangular blocky

structure; firm, slightly sticky and slightly plastic; few fine and medium roots; few fine pores; few fine flakes of mica; strongly acid; gradual wavy boundary.

C—35 to 60 inches; multicolored loam that weathered from saprolite; massive; friable; few fine roots in upper part; common fine flakes of mica; strongly acid.

The thickness of the solum ranges from 20 to 40 inches (fig. 15). The depth to hard bedrock is more than 60 inches. Reaction is very strongly acid to slightly acid in the A horizon, except where the surface layer has been limed, and is very strongly acid to moderately acid throughout the rest of the profile. The content of rock fragments ranges from 0 to 15 percent in the A horizon and from 0 to 10 percent in the B horizon. Most pedons have few or common flakes of mica in one or more subhorizons.

The A or Ap horizon has hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 2 to 8. It is clay loam or sandy clay loam.

The BA horizon, if it occurs, has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 3 to 8. It is clay loam, sandy clay loam, or loam.

The Bt horizon has hue of 10R or 2.5YR, value of 4 or 5, and chroma of 6 to 8. In some pedons it has mottles in shades of yellow or brown. It is clay, sandy clay, or clay loam.

The BC horizon has hue of 10R to 5YR, value of 4 or 5, and chroma of 6 to 8. It has mottles in shades of yellow, brown, or red. It is clay loam, sandy clay loam, loam, or sandy loam.

The C horizon is multicolored saprolite that weathered from felsic crystalline rocks. The texture varies, but commonly is sandy loam, loam, clay loam, or sandy clay loam.

Secrest Series

The Secrest series consists of deep, moderately well drained, slowly permeable soils on low ridges in the uplands, on broad flats, in depressions, and at the head of drainageways. These soils formed in material weathered from Carolina Slates. Slopes range from 0 to 3 percent. The soils are fine-silty, siliceous, thermic Aquic Hapludults.

Secrest soils are commonly associated with Badin, Cid, Georgeville, Goldston, Misenheimer, and Tatum soils. The well drained Badin, Georgeville, and Tatum soils are on the higher parts of the landscape. The moderately well drained and somewhat poorly drained Cid soils have bedrock within 40 inches of the surface. The well drained to excessively drained Goldston soils are shallow and are in areas of more rolling topography than the Secrest soils. The moderately well drained and somewhat poorly drained Misenheimer soils are shallow.

Typical pedon of Secrest silt loam, in an area of Secrest-Cid complex, 0 to 3 percent slopes; about 4.0 miles northwest of Monroe on US Highway 74, about 500 feet north on Secondary Road 1514, about 1.0 mile north on Secondary Road 1512, in a cultivated field 75 feet west of the road; USGS Bakers topographic quadrangle; lat. 35 degrees 02 minutes 57 seconds N. and long. 80 degrees 36 minutes 30 seconds W.

Ap—0 to 8 inches; pale brown (10YR 6/3) silt loam; weak medium granular structure; very friable; common fine roots; few slate channers; slightly acid; abrupt smooth boundary.

BA—8 to 11 inches; olive yellow (2.5Y 6/6) silt loam; weak medium granular structure; friable; common fine roots; common medium pores; few slate channers; strongly acid; clear wavy boundary.

Bt1—11 to 21 inches; brownish yellow (10YR 6/6) silty clay loam; few fine distinct light gray (2.5Y 7/2) mottles; weak medium subangular blocky structure; friable, sticky and slightly plastic; few distinct clay films on faces of peds; few fine roots; common fine and medium pores; very strongly acid; clear wavy boundary.

Bt2—21 to 43 inches; brownish yellow (10YR 6/6) silty clay loam; common medium distinct light brownish gray (2.5Y 6/2) and few medium distinct yellow (2.5Y 7/6) mottles; moderate medium subangular blocky structure; firm, sticky and slightly plastic; few distinct clay films on faces of peds; few fine roots; common fine and medium pores; very strongly acid; gradual wavy boundary.

BC—43 to 54 inches; mottled brownish yellow (10YR 6/6) and light brownish gray (10YR 6/2) silty clay; weak medium subangular blocky structure; firm, sticky and plastic; few faint clay films on faces of peds; few slate channers; very strongly acid; gradual wavy boundary.

Cr—54 to 62 inches; weathered, fractured slate bedrock that can be dug with difficulty with hand tools; thin seams of light gray (10YR 6/1) silty clay loam and white (10YR 8/1) silt loam in fractures 10 to 15 inches apart.

R—62 inches; hard, fractured slate bedrock.

The thickness of the solum ranges from 40 to 55 inches. The depth to weathered bedrock is 40 to 60 inches. The depth to hard bedrock is more than 60 inches. The content of rock fragments of quartz or slate ranges from 0 to 35 percent in the A horizon, from 0 to 15 percent in the B horizon, from 0 to 35 percent in the C horizon, and from 0 to 35 percent in the E horizon, if

it occurs. Reaction is very strongly acid to moderately acid throughout the solum, except where the surface layer has been limed.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 to 4. The E horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 to 6. It is silt loam, loam, or very fine sandy loam in the fine-earth fraction.

The BA horizon or the BE horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 3 to 6. It is silt loam or silty clay loam.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 4 to 8. It has mottles in shades of gray, brown, yellow, or olive. It is commonly silty clay loam or clay loam but ranges to silty clay in the lower part of the horizon.

The BC horizon and the C horizon, if it occurs, have hue of 7.5YR to 5Y, value of 5 to 7, and chroma of 3 to 8. They have mottles in shades of gray, brown, yellow, or olive. They are clay, silty clay, or silty clay loam.

The Cr horizon is weathered, fractured slate bedrock that can be dug with hand tools. Thin seams of silt loam, silty clay loam, or silty clay material are in cracks between rocks.

Tatum Series

The Tatum series consists of deep, well drained, moderately permeable soils on ridges and side slopes in the uplands. These soils formed in material weathered from Carolina Slates. Slopes range from 2 to 35 percent. The soils are clayey, mixed, thermic Typic Hapludults.

Tatum soils are commonly associated with Badin, Cecil, Cid, Georgeville, Goldston, and Secrest soils. The well drained Badin soils have soft bedrock within 40 inches of the surface. The well drained Cecil soils are very deep and have less than 30 percent silt in the particle-size control section. The moderately well drained and somewhat poorly drained Cid soils and the moderately well drained Secrest soils are on the lower parts of the landscape. The well drained Georgeville soils have kaolinitic mineralogy and are very deep to soft bedrock. The well drained to excessively drained Goldston soils are shallow and are in areas of more rolling topography than the Tatum soils.

Typical pedon of Tatum gravelly silty clay loam, 2 to 8 percent slopes, eroded, about 0.45 mile south on Secondary Road 1162 from its intersection with Secondary Road 1315, about 600 feet west of the road on a farm road, 50 feet south of the farm road in a cultivated field; USGS Waxhaw topographic quadrangle; lat. 34 degrees 58 minutes 09 seconds N. and long. 80 degrees 39 minutes 45 seconds W.

Ap—0 to 6 inches; yellowish red (5YR 5/4) gravelly silty clay loam; moderate medium granular structure; friable; common fine roots; about 20 percent angular quartz pebbles and slate channers; slightly acid; abrupt smooth boundary.

Bt1—6 to 23 inches; red (2.5YR 4/6) silty clay; moderate medium angular blocky structure; firm, sticky and plastic; few fine roots; common distinct clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt2—23 to 33 inches; red (2.5YR 4/8) silty clay; common medium distinct strong brown (7.5YR 5/8) mottles; weak medium angular blocky structure; firm, sticky and plastic; few fine roots; common distinct clay films on faces of peds; strongly acid; gradual wavy boundary.

BC—33 to 45 inches; mixed red (2.5YR 5/8), strong brown (7.5YR 5/8), and yellow (10YR 7/6) silty clay loam; weak medium subangular blocky structure; friable; few fine roots; strongly acid; gradual irregular boundary.

C—45 to 54 inches; multicolored silt loam that weathered from saprolite; massive; friable; few pockets of red silty clay loam; very strongly acid; clear smooth boundary.

Cr—54 to 61 inches; weathered, fractured slate bedrock.

R—61 inches; hard, fractured slate bedrock.

The thickness of the solum ranges from 40 to 60 inches. The depth to weathered bedrock also ranges from 40 to 60 inches. The depth to hard bedrock is more than 60 inches. Reaction is very strongly acid or strongly acid throughout the soils, except where the surface layer has been limed. The content of rock fragments ranges from 0 to 40 percent in individual horizons.

The Ap or A horizon dominantly has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 8. In eroded areas, however, it has hue of 5YR. It is gravelly silt loam or gravelly silty clay loam.

The E horizon, if it occurs, has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 to 6. It is loam, silt loam, or fine sandy loam in the fine-earth fraction.

The BE horizon, if it occurs, has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 3 to 8. It is loam, clay loam, or silty clay loam in the fine-earth fraction.

The Bt horizon has hue of 10R or 2.5YR, value of 4 or 5, and chroma of 6 to 8. In some pedons it has mottles in shades of red, yellow, or brown. It is silty clay loam, silty clay, clay loam, or clay in the fine-earth fraction.

The BC horizon commonly has hue of 10R to 5YR, value of 4 to 6, and chroma of 4 to 8. In some pedons it

has mottles or streaks in shades of these colors. It is clay loam, silty clay loam, or silty clay in the fine-earth fraction.

The C horizon is multicolored saprolite. The texture varies, but commonly is loam or silt loam in the fine-earth fraction.

The Cr horizon is weathered slate bedrock that can be dug with hand tools.

The R layer is hard, fractured slate bedrock.

Udorthents

Udorthents consist of areas where the natural soil has been altered by excavation or covered by earthy fill material. These areas include borrow areas, gold mines, landfills, and rock quarries. The areas vary in drainage but most are well drained or moderately well drained. The altered soils are predominantly loamy or clayey. The thickness of the soil material and the type of underlying material vary. Slopes range from nearly level to steep, and some areas are undulating.

A typical pedon is not given for these soils because of their variability. The fill areas are more than 20 inches deep and as much as 30 feet thick. Landfills have layers of nonsoil material covered by loamy soil material.

Udorthents are in shades of red, brown, yellow, or gray. The texture varies, but typically is loamy. Reaction ranges from extremely acid to slightly acid.

White Store Series

The White Store series consists of moderately well drained, slowly permeable soils on ridges and side slopes in the uplands. These soils formed in material weathered from Triassic rocks, such as shale, mudstone, and sandstone. They are deep to saprolite and very deep over hard bedrock. Slopes range from 2 to 15 percent. The soils are fine, mixed, thermic Vertic Hapludalfs.

White Store soils are commonly associated with Creedmoor and Goldston soils. The moderately well drained and somewhat poorly drained Creedmoor soils have mixed mineralogy and have a coarser texture in the upper part of the subsoil than the White Store soils. The well drained to excessively drained Goldston soils are shallow.

Typical pedon of White Store loam, 2 to 8 percent slopes, about 0.45 mile northeast on Zion Church Road from its intersection with Canal Road to a farm road, 400 feet northeast of the farm road in a cultivated field; USGS Hornsboro topographic quadrangle; lat. 34 degrees 50 minutes 35 seconds N. and long. 80 degrees 21 minutes 01 second W.

Ap—0 to 6 inches; dark brown (10YR 4/3) loam; moderate medium granular structure; friable; many fine roots; few quartz pebbles; neutral; abrupt smooth boundary.

Bt1—6 to 20 inches; yellowish red (5YR 4/6) clay; coarse medium angular blocky structure; firm, sticky and plastic; few fine roots; common distinct clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt2—20 to 33 inches; yellowish red (5YR 4/6) clay; few fine prominent light brownish gray (10YR 6/2) and few fine prominent brown (10YR 5/3) mottles; coarse medium angular blocky structure; very firm, very sticky and very plastic; few medium roots; common distinct clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bt3—33 to 41 inches; yellowish red (5YR 4/6) clay; common medium prominent light brownish gray (10YR 6/2) and common medium distinct red (2.5YR 4/6) mottles; moderate medium angular blocky structure; very firm, very sticky and very plastic; few distinct clay films on faces of peds; very strongly acid; gradual wavy boundary.

BC—41 to 50 inches; dark red (2.5YR 3/6) silty clay; few medium prominent light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; firm, sticky and plastic; few faint clay films on faces of peds; common medium fragments of siltstone; very strongly acid; gradual wavy boundary.

Cr—50 to 62 inches; weathered siltstone that can be dug with hand tools; thin seams of dark red (2.5YR 3/6) silty clay loam in cracks between rocks.

The thickness of the solum ranges from 20 to 50 inches. The depth to weathered bedrock is 40 to 60 inches. The depth to hard bedrock is more than 60 inches. The content of rock fragments ranges from 0 to 5 percent in the A and B horizons. Reaction is strongly acid or very strongly acid throughout the solum, except where the surface layer has been limed.

The A or Ap horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 4. The E horizon, if it occurs, has hue of 7.5YR to 2.5YR, value of 4 to 6, and chroma of 3 to 6.

The Bt horizon has hue of 2.5YR to 10YR, value of 3 to 6, and chroma of 3 to 8. In some pedons it has mottles in shades of these colors.

The BC horizon has hue of 2.5YR to 10YR, value of 3 to 6, and chroma of 3 to 8. It has mottles in shades of red, brown, yellow, or gray. It is silty clay, clay loam, sandy clay loam, or silty clay loam.

The C horizon, if it occurs, is multicolored saprolite

that weathered from Triassic sandstone, mudstone, siltstone, or shale. The texture varies, but commonly is silt loam, sandy loam, clay loam, or silty clay loam.

The Cr horizon is weathered Triassic sandstone, mudstone, siltstone, or shale that can be dug with hand tools.

Zion Series

The Zion series consists of moderately deep, well drained, slowly permeable soils on ridges and side slopes in the uplands. These soils formed in material weathered from mafic crystalline rocks. They are in many areas over dikes or igneous intrusions. Slopes range from 2 to 15 percent. The soils are fine, mixed, thermic Ultic Hapludalfs.

Zion soils are commonly associated with Badin, Cecil, Cid, Georgeville, Iredell, Mecklenburg, and Tatum soils. The well drained Badin, Georgeville, and Tatum soils have more than 30 percent silt in the particle-size control section. The well drained Cecil soils have kaolinitic mineralogy. The moderately well drained and somewhat poorly drained Cid soils are on the lower parts of the landscape. The moderately well drained and somewhat poorly drained Iredell soils have montmorillonitic mineralogy. The well drained Mecklenburg soils have hue of 5YR or redder in the subsoil.

Typical pedon of Zion gravelly loam, 2 to 8 percent slopes, about 2.0 miles east of Waxhaw on North Carolina Highway 75, about 1,400 feet south of the road in a cultivated field; USGS Waxhaw topographic quadrangle; lat. 34 degrees 55 minutes 32 seconds N. and long. 80 degrees 42 minutes 15 seconds W.

Ap—0 to 8 inches; brown (10YR 5/3) gravelly loam; weak medium granular structure; very friable; common fine roots; about 15 percent rock fragments; few fine black concretions; slightly acid; clear smooth boundary.

Bt1—8 to 15 inches; yellowish brown (10YR 5/4) gravelly clay loam; moderate medium angular blocky structure; firm, sticky and plastic; common prominent clay films on faces of peds; common fine roots; about 20 percent rock fragments; common black concretions; moderately acid; gradual wavy boundary.

Bt2—15 to 23 inches; dark yellowish brown (10YR 4/4) clay; common medium distinct yellowish brown (10YR 5/6) mottles; strong medium angular blocky structure; very firm, very sticky and very plastic; few fine and medium roots; few fine pores; common prominent clay films on faces of peds; few black concretions; about 5 percent rock fragments; slightly acid; gradual wavy boundary.

BC—23 to 26 inches; mixed yellowish brown (10YR 5/8) and brown (10YR 5/4) gravelly clay loam; moderate medium angular blocky structure; very firm, sticky and very plastic; few fine and medium roots; few distinct clay films on faces of peds; few black concretions; about 25 percent rock fragments; neutral; gradual wavy boundary.

C—26 to 30 inches; multicolored gravelly clay loam that weathered from saprolite; massive; about 20 percent rock fragments; few black concretions; neutral; gradual irregular boundary.

R—30 inches; hard mafic bedrock.

The thickness of the solum ranges from 20 to 40 inches. The depth to hard bedrock also ranges from 20 to 40 inches (fig. 16). The content of rock fragments ranges from 15 to 35 percent in the A horizon, from 2 to 15 percent in the Bt horizon, and from 5 to 40 percent in the BC and C horizons. It ranges from 15 to 35 percent in the E horizon and from 5 to 60 percent in the BE horizon, if they occur. The fragments consist of iron and manganese concretions, mafic rock, and angular quartz pebbles. Reaction is strongly acid to moderately acid in the A and E horizons and in the upper parts of the B horizon, except where the surface layer has been limed, and is moderately acid to neutral in the lower part of the B horizon and in the C horizon.

The A horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 2 or 3. The E horizon, if it occurs, has hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 6. It is loam, silt loam, fine sandy loam, or sandy loam in the fine-earth fraction.

The BE horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. It is loam, silt loam, or clay loam.

The Bt horizon has hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. It is clay loam, silty clay, or clay in the fine-earth fraction.

The BC horizon has hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8 or has mixed shades of these colors. It is clay loam, loam, or sandy clay loam in the fine-earth fraction.

The C horizon is multicolored saprolite. It is dominantly silt loam, loam, clay loam, or sandy clay loam in the fine-earth fraction. In some pedons, however, it has a few seams, tongues, or thin layers of clayey material in the upper part.

The Cr horizon, if it occurs, is multicolored, weathered mafic bedrock that is partially consolidated but can be dug with hand tools.

The R layer is hard mafic bedrock.

Formation of the Soils

Soils are formed by process of the environment acting upon geologic agents, such as metamorphic, igneous, and sedimentary rocks and fluvial stream sediments. The characteristics of a soil are determined by the combined influence of parent material, climate, plant and animal life, relief, and time. These five factors are responsible for the profile development and chemical properties that differentiate soils *(3)*.

Parent Material

Parent material is the unconsolidated mass in which a soil forms. The character of this mass affects the kind of profile that develops and the degree of development. In Union County, parent material is a major factor in determining what kind of soil forms and can be correlated to some degree to geologic formations. The general soil map is an approximate guide to the geology of the county.

The major type of rock in the county is the fine-grained metamorphic rock referred to as "Carolina Slates." Soils from four general soil map units formed in material weathered from Carolina Slates. These soils include Badin, Cid, Goldston, and Tatum soils. Soils in the Cecil-Appling general soil map unit formed in material weathered from felsic crystalline rock. Soils in the Iredell-Gaston-Mecklenburg general soil map unit dominantly formed in material weathered from mafic crystalline rock. Within the Triassic Basin, the White Store-Creedmoor-Chewacla general soil map unit includes soils the formed in material weathered from shale, mudstone, and sandstone.

Parent material is largely responsible for the chemical and mineralogical composition of soils and for the major differences between the soils of the county. Major differences between parent materials, such as differences in texture, can be observed in the field. Less distinct differences, such as differences in mineralogical composition, can be determined only by careful laboratory analysis.

Climate

Climatic factors, particularly precipitation and temperature, affect the physical, chemical, and biological relationships in soil. They influence the rates at which rocks weather and organic matter decomposes. The amount of leaching in a soil is related to the amount of rainfall and the movement of the water through the soil. The effects of climate also control the kinds of plants and animals that can thrive in a region. Temperature influences the kinds of organisms in a region and their growth. It also influences the speed of chemical and physical reactions in soil.

Union County has a warm, humid climate and ranges in elevation from about 275 to 770 feet above sea level. The climate favors rapid chemical processes, resulting in the decomposition of organic matter and the weathering of rocks. The mild temperatures and the abundant rainfall cause intense leaching and oxidizing.

The effects of climate are evident in the soils of the county. The mild temperatures throughout the year and the abundant rainfall have depleted the content of organic matter in the soils and leached the soluble bases. Because variations in climate throughout the county are small, climate probably has not caused major local differences between soils. The most important effect of climate on the formation of the soils in the county is the alteration of parent material through changes in temperature and the amount of precipitation and through influences on plant and animal life.

Plant and Animal Life

Plants and animals influence the formation and differentiation of soil horizons. The kind and number of organisms in and on the soil are determined partly by climate and partly by the nature of the soil material, relief, and the age of the soil. Bacteria, fungi, and other micro-organisms aid in the weathering of rocks and in the decomposition of organic matter. The plants and animals that live on a soil are the primary source of organic matter.

Plants generally determine the kinds and amounts of organic matter that enter a soil under normal conditions and how the organic matter is added. They also affect base status and the leaching process through the nutrient cycle. In Union County, plants do not bring

enough base material to the surface to counteract the effects of leaching.

Generally, the soils in the county formed under a hardwood forest. Trees take up elements from the subsoil and add organic matter to the soil by depositing leaves, roots, twigs, and eventually branches and trunks. The material is acted upon by organisms and undergoes chemical reactions.

Animals convert complex compounds into simpler forms, add organic matter to the soil, and modify certain chemical and physical properties. In Union County, most of the organic matter accumulates on the surface. It is acted upon by micro-organisms, fungi, earthworms, and other forms of life and by direct chemical reaction. It is mixed with the uppermost mineral part of the soil by the activities of earthworms and other small invertebrates. Rodents have had little effect on the formation of the soils in the county.

Organic matter decomposes rapidly in the county because of the moderate temperatures, the abundant moisture, and the character of the organic matter. It decays so rapidly that little of it accumulates in the soil.

Relief

Relief influences free drainage, surface runoff, soil temperature, the extent of geologic erosion, and the percolation of water through the profile. Water movement is important to soil formation because it aids chemical reactions and is necessary for leaching. In Union County, relief is generally determined by the kind of underlying bedrock, the geology of the area, and the amount of dissection of the landscape by streams.

Slopes range from 0 to 45 percent in the county. In the uplands, such soils as the Cecil and Georgeville soils that have a slope of less than 10 percent generally have a deeper, better defined profile then that of the steeper soils. Relief can also affect the depth of a soil. In areas where the slope is more than 15 percent, geologic erosion removes soil material almost as fast as it forms. As a result, most of the strongly sloping to steep soils have a thinner solum than that of the less sloping soils. Examples are Pacolet and Goldston soils, which are neither so deep nor so well developed as the less sloping soils.

Relief can also affect drainage. For example, a high water table generally is related to nearly level relief. The Secrest and Iredell soils on uplands are moderately well drained and somewhat poorly drained because they are nearly level and the movement of water through them is slow. Soils at the lower elevations are less sloping and receive runoff from the adjacent higher areas. This water accumulates in the nearly level to depressional areas.

Time

The length of time that soil material has been exposed to the soil-forming processes accounts for some differences between soils. The formation of a well-defined profile, however, depends on other factors. Less time is required for a profile to develop in coarse textured material than in similar but finer textured material, even if the environment is the same for both materials. Less time is required for a profile to develop in an area, such as Union County, that is warm, humid, and has a dense plant cover than in a cold, dry area that has a sparse plant cover.

Soils vary considerably in age. The length of time that a soil has been forming is reflected in the profile. Old soils generally have better defined horizons than young soils. In Union County, the effects of time as a soil-forming factor are more apparent in the older soils that are in the broader parts of the uplands. Examples are Cecil and Georgeville soils. These soils have more distinct horizons than Chewacla soils, which formed in alluvium. Chewacla soils have not been in place long enough to have developed distinct horizons. They are considered young soils. Other soils in the county are considered young because of their topographic position. Goldston soils, for example, are not well developed because they are on steep landscapes and geologic erosion has kept pace with soil development. The rate of geologic erosion also partly accounts for the shallowness of the Goldston soils over bedrock.

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Atterberg limits. Atterberg limits are measured for soil materials passing the No. 40 sieve. They include the liquid limit (LL), which is the moisture content at which the soil passes from a plastic to a liquid state, and the plasticity index (PI), which is the water content corresponding to an arbitrary limit between the plastic and semisolid states of consistency of a soil.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Basic rock. An igneous rock composed dominantly of dark minerals. The minerals of this rock are comparatively low in silica and rich in bases, such as the amphiboles, the pyroxenes, biotite, and olivine.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Clayey. A general textural term that includes sandy clay, silty clay, and clay. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) containing 35 percent or more clay, by weight, within the control section. The content of rock fragments is less than 35 percent, by volume.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root

channels. Synonyms: clay coating, clay skin.

CMAI (cumulative mean annual increment). The age or rotation at which growing stock of a forest produces the greatest annual growth (for that time period). It is the age at which periodic annual growth and mean annual growth are equal.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Dbh (diameter at breast height). The diameter of a tree at 4.5 feet above the ground level on the uphill side.

Deferred grazing. Postponing grazing or resting grazingland for a prescribed period.

Delineation. The process of drawing or plotting features on a map with lines and symbols.

Depth class. Refers to the depth to a root-restricting layer. Unless otherwise stated, this layer is understood to be consolidated bedrock. The depth classes in this survey are:

Very shallow	less than 10 inches
Shallow	10 to 20 inches
Moderately deep	20 to 40 inches
Deep	40 to 60 inches
Very deep	more than 60 inches

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Dike. A long, narrow, cross cutting mass of igneous rock that extends to or crops out on the land surface.

Diorite. A coarse grained igneous rock with the composition of andesite (no quartz or orthoclase). It is composed of about 75 percent plagioclase feldspars with the balance being ferromagnesian silicates.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and

duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Engineering index test data. Laboratory test and mechanical analysis of selected soils in the county.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic)—Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated)—Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as fire, that exposes the surface.

Erosion classes. Classes based on estimates of past erosion. The classes are as follows:

Class 1.—Soils that have lost some of the original A horizon but on the average less than 25 percent of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). Throughout most of the area, the thickness of the surface layer is within the normal range of variability of the uneroded soil. Class 1 erosion typically is not designated in the name of the map unit or in the map symbol.

Class 2.—Soils that have lost an average of 25 to 75 percent of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). Throughout most cultivated areas of class 2 erosion, the surface layer consists of a mixture of the original A horizon and material from below. Some areas may have intricate patterns ranging from uneroded spots to spots where all of the original A horizon has been removed.

Class 3.—Soils that have lost an average of 75 percent or more of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). In most cultivated areas of class 3 erosion, material that was below the original A horizon is exposed. The plow layer

consists entirely or largely of this material.

Class 4.—Soils that have lost all of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick) plus some or all of the deeper horizons throughout most of the area. The original soil can be identified only in spots. Some areas may be smooth, but most have an intricate pattern of gullies.

Erosion hazard. Terms describing the potential for future erosion, inherent in the soil itself, in inadequately protected areas. The following definitions are based on estimated annual soil loss in tons per acre (values determined by the Universal Soil Loss Equation assuming bare soil conditions and using rainfall and climate factors for North Carolina):

0 tons per acre	none
Less than 1 ton per acre	slight
1 to 5 tons per acre	moderate
5 to 10 tons per acre	severe
More than 10 tons per acre	very severe

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fast intake (in tables). The rapid movement of water into the soil.

Felsic rock. A general term for light colored igneous rock and some metamorphic crystalline rock that have an abundance of quartz, feldspars, feldspathoids, and muscovite mica.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Flooding. The temporary covering of the soil surface by flowing water from any source, such as overflowing streams, runoff from adjacent or surrounding slopes, and inflow from high tides. The frequency of flooding generally is expressed as none, rare, occasional, or frequent. *None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year). *Frequent* means that flooding occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). The duration of flooding is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month).

Foot slope. The inclined surface at the base of a hill.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Gneiss. A coarse grained metamorphic rock in which bands rich in granular minerals alternate with bands in which schistose minerals predominate. It is commonly formed by the metamorphism of granite.

Granite. A coarse grained igneous rock dominated by light colored minerals, consisting of about 50 percent orthoclase and 25 percent quartz with the balance being plagioclase feldspars and ferromagnesian silicates. Granites and granodiorites comprise 95 percent of all intrusive rocks.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.5 centimeters) in diameter.

Ground water (geology). Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily

runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is, in part, a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as accumulation of clay, sesquioxides, humus, or a combination of these; prismatic or blocky structure; redder or browner colors than those in the A horizon; or a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated rock (unweathered bedrock) beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Infiltration. The downward entry of water into the immediate surface of soil or other material. This contrasts with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the surface through pipes or nozzles from a pressure system.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loamy. A general textural term that includes coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, and silty clay loam. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) of loamy very fine sand or finer textured material that contains less than 35 percent clay, by weight, within the control section. The content of rock

fragments is less than 35 percent, by volume.

Low strength. The soil is not strong enough to support loads.

Mafic rock. A dark rock composed predominantly of magnesium silicates. It contains little quartz, feldspar, or muscovite mica.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Micas. A group of silicate minerals characterized by sheet or scale cleavage. Biotite is the ferromagnesian black mica. Muscovite is the potassic white mica.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Muscovite. A nonferromagnesian rock-forming silicate mineral with its tetrahedra arranged in sheets. It is commonly called "white mica" and sometimes called "potassic mica."

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

No-till planting. A method of planting crops in which there is virtually no seedbed preparation. A thin slice of the soil is opened, and the seed is planted at the desired depth.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affects the specified use.

Permeability. The quality of the soil that enables water to move through the profile. Permeability is measured as the number of inches per hour that water moves through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piedmont. The physiographic region of central North Carolina characterized by rolling landscapes formed from the weathering of residual rock material.

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range in moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of the acidity or alkalinity of a soil expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	below 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Reforestation. The process in which tree seedlings are planted or become naturally established in an area that was once forested.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rippable. Rippable bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 drawbar horsepower rating.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Runoff class (surface). Refers to the rate at which water flows away from the soil over the surface without infiltrating. Six classes of rate of runoff are recognized:

Ponded.—Little of the precipitation and water that runs onto the soil escapes as runoff, and free water stands on the surface for significant periods. The amount of water that is removed from ponded areas by movement through the soil, by plants, or by evaporation is usually greater than the total rainfall. Ponding normally occurs on level and nearly level soils in depressions. The water depth may fluctuate greatly.

Very slow.—Surface water flows away slowly, and free water stands on the surface for long periods or immediately enters the soil. Most of the water passes through the soil, is used by plants, or evaporates. The soils are commonly level or nearly level or are very porous.

Slow.—Surface water flows away so slowly that free water stands on the surface for moderate periods or enters the soil rapidly. Most of the water passes through the soil, is used by plants, or evaporates. The soils are nearly level or very gently sloping, or they are steeper but absorb precipitation very rapidly.

Medium.—Surface water flows away so rapidly that free water stands on the surface for only short periods. Part of the precipitation enters the soil and is used by plants, is lost by evaporation, or moves into underground channels. The soils are nearly level or gently sloping and absorb precipitation at a moderate rate, or they are steeper but absorb water rapidly.

Rapid.—Surface water flows away so rapidly that the period of concentration is brief and free water does not stand on the surface. Only a small part of the water enters the soil. The soils are mainly moderately steep or steep and have moderate or slow rates of absorption.

Very rapid.—Surface water flows away so rapidly that the period of concentration is very brief and free water does not stand on the surface. Only a small part of the water enters the soil. The soils are mainly steep or very steep and absorb precipitation slowly.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sandy. A general textural term that includes coarse sand, sand, fine sand, very fine sand, loamy coarse sand, loamy sand, loamy fine sand, and

loamy very fine sand. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) of sand or loamy sand that contains less than 50 percent very fine sand, by weight, within the control section. The content of rock fragments is less than 35 percent, by volume.

Saprolite (soil science). Unconsolidated, residual material underlying the soil and grading to hard bedrock below.

Schist. A metamorphic rock dominated by fibrous or platy minerals. It has schistose cleavage and is a product of regional metamorphism.

Seasonal high water table. The highest level of a saturated zone (the apparent or perched water table) over a continuous period of more than 2 weeks in most years, but not a permanent water table.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Skidding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most systems involve pulling the trees with wire cables attached to a bulldozer or rubber-tired tractor. Generally, felled trees are skidded or pulled with one end lifted to reduce friction and soil disturbance.

Skid trails. The paths left from skidding logs and the bulldozer or tractor used to pull them.

Slate. A fine grained metamorphic rock with well developed slaty cleavage. Formed by the low-grade regional metamorphism of shale.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey area slope classes are as follows:

Nearly level	0 to 2 percent
Gently sloping	2 to 8 percent
Strongly sloping	8 to 15 percent
Moderately steep	15 to 35 percent
Steep	35 to 45 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to Ca^{++} + Mg^{++}. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil compaction. An alteration of soil structure that ultimately can affect the biological and chemical properties of the soil. Compaction decreases the extent of voids and increases bulk density.

Soil map unit. A kind of soil or miscellaneous area or a combination of two or more soils or one or more soils and one or more miscellaneous areas that can be shown at the scale of mapping for the defined purposes and objectives of the soil survey. They are generally designed to reflect significant differences in use and management.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between

specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Soil strength. Load supporting capacity of a soil at specific moisture and density conditions.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in organic matter content than the overlying surface layer.

Suitability ratings. Ratings for the degree of suitability of soils for pasture, crops, woodland, and engineering uses. The ratings and the general criteria used for their selection are as follows:

Well suited.—The intended use may be initiated and maintained by using only the standard materials and methods typically required for that use. Good results can be expected.

Suited or moderately suited.—The limitations affecting the intended use make special planning, design, or maintenance necessary.

Poorly suited.—The intended use is difficult or costly to initiate and maintain because of certain soil properties, such as steep slopes, a high hazard of erosion, a high water table, low fertility, and a hazard of flooding. Major soil reclamation, special design, or intensive management practices are needed.

Very poorly suited, not suited, or unsuited.—The intended use is very difficult or costly to initiate and maintain, and thus it generally should not be undertaken.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Terrace. An embankment, or ridge, constructed on the contour or at a slight angle to the contour across sloping soils. The terrace intercepts surface runoff, so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine." The textural classes are defined as follows:

Sands (coarse sand, sand, fine sand, and very fine sand).—Soil material in which the content of sand is 85 percent or more and the percentage of silt plus 1½ times the percentage of clay does not exceed 15.

Loamy sands (loamy coarse sand, loamy sand, loamy fine sand, and loamy very fine sand).—Soil material in which, at the upper limit, the content of sand is 85 to 90 percent and the percentage of silt plus 1½ times the percentage of clay is not less than 15; at the lower limit, the content of sand is 70 to 85 percent and the percentage of silt plus twice the percentage of clay does not exceed 30.

Sandy loams (coarse sandy loam, sandy loam, fine sandy loam, and very fine sandy loam).—Soil material in which the content of clay is 20 percent or less, the percentage of silt plus twice the percentage of clay exceeds 30, and the content of sand is 52 percent or more or soil material in which the content of clay is less than 7 percent,

the content of silt is less than 50 percent, and the content of sand is 43 to 52 percent.

Loam.—Soil material that contains 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand.

Silt loam.—Soil material that contains 50 or more percent silt and 12 to 27 percent clay or 50 to 80 percent silt and less than 12 percent clay.

Silt.—Soil material that contains 80 or more percent silt and less than 12 percent clay.

Sandy clay loam.—Soil material that contains 20 to 35 percent clay, less than 28 percent silt, and 45 or more percent sand.

Clay loam.—Soil material that contains 27 to 40 percent clay and 20 to 45 percent sand.

Silty clay loam.—Soil material that contains 27 to 40 percent clay and less than 20 percent sand.

Sandy clay.—Soil material that contains 35 or more percent clay and 45 or more percent sand.

Silty clay.—Soil material that contains 40 or more percent clay and 40 or more percent silt.

Clay.—Soil material that contains 40 or more percent clay, less than 45 percent sand, and less than 40 percent silt.

Thin layer (in tables). A layer of otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topography. The relative positions and elevations of the natural or manmade features of an area that describe the configuration of its surface.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Underlying material. Technically the C horizon; the part of the soil below the biologically altered A and B horizons.

Understory. The trees and other woody species growing under a more or less continuous cover of branches and foliage formed collectively by the upper portions of adjacent trees and other woody growth.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Water table (apparent). A thick zone of free water in the soil. The apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table (perched). A saturated zone of water in the soil standing above an unsaturated zone.

Water table (seasonal high). The highest level of a saturated zone in the soil (the apparent or perched water table) over a continuous period of more than 2 weeks in most years, but not a permanent water table.

Weathering. All physical and chemical changes produced by atmospheric agents in rocks or other deposits at or near the earth's surface. These changes result in disintegration and decomposition of the material.

Wetness. A general term applied to soils that hold water at or near the surface long enough to be a common management problem.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1951-81 at Monroe, North Carolina)

Month	Temperature: Average daily maximum	Temperature: Average daily minimum	Temperature: Average daily	Temperature: 2 years in 10 will have-- Maximum temperature higher than--	Temperature: 2 years in 10 will have-- Minimum temperature lower than--	Temperature: Average number of growing degree days*	Precipitation: Average	Precipitation: 2 years in 10 will have-- Less than--	Precipitation: 2 years in 10 will have-- More than--	Precipitation: Average number of days with 0.10 inch or more	Precipitation: Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	52.5	31.0	41.8	74	8	51	4.00	2.16	5.60	7	1.3
February----	56.2	32.3	44.3	76	11	48	3.99	2.14	5.62	7	1.5
March-------	63.8	39.4	51.6	83	18	150	4.59	2.98	6.05	8	.9
April-------	74.1	48.4	61.3	90	28	339	3.13	1.62	4.44	6	.0
May---------	80.6	56.3	68.5	93	35	574	3.56	1.70	5.16	7	.0
June--------	86.7	63.6	75.2	99	47	756	3.88	2.03	5.50	7	.0
July--------	89.3	67.5	78.4	99	55	880	5.21	2.96	7.21	8	.0
August------	88.5	66.6	77.6	98	53	856	4.67	1.96	6.96	7	.0
September---	83.4	60.4	71.9	95	42	657	4.15	1.13	6.58	5	.0
October-----	73.5	48.0	60.8	89	26	339	3.21	.74	5.17	5	.0
November----	64.1	39.1	51.6	83	17	104	2.72	1.14	4.05	5	.0
December----	54.9	32.6	43.8	75	10	52	3.56	1.74	5.13	7	.8
Yearly:											
Average---	72.3	48.8	60.6	---	---	---	---	---	---	---	---
Extreme---	---	---	---	100	6	---	---	---	---	---	---
Total-----	---	---	---	---	---	4,806	46.67	41.06	52.27	79	4.5

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1951-81 at Monroe, North Carolina)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Mar. 31	Apr. 9	Apr. 29
2 years in 10 later than--	Mar. 24	Apr. 5	Apr. 23
5 years in 10 later than--	Mar. 10	Mar. 28	Apr. 13
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 28	Oct. 22	Oct. 12
2 years in 10 earlier than--	Nov. 2	Oct. 26	Oct. 16
5 years in 10 earlier than--	Nov. 12	Nov. 3	Oct. 24

TABLE 3.--GROWING SEASON

(Recorded in the period 1951-81 at Monroe, North Carolina)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	221	203	174
8 years in 10	230	209	181
5 years in 10	246	219	193
2 years in 10	263	229	206
1 year in 10	271	234	213

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AeB	Ailey-Appling complex, 2 to 8 percent slopes	1,825	0.4
AgC	Ailey-Appling complex, 8 to 15 percent slopes, bouldery	563	0.1
ApB	Appling sandy loam, 2 to 8 percent slopes	3,081	0.8
ApC	Appling sandy loam, 8 to 15 percent slopes	417	0.1
AuB	Appling-Urban land complex, 2 to 8 percent slopes	396	0.1
BaB	Badin channery silt loam, 2 to 8 percent slopes	53,763	13.2
BaC	Badin channery silt loam, 8 to 15 percent slopes	9,497	2.3
BdB2	Badin channery silty clay loam, 2 to 8 percent slopes, eroded	30,043	7.3
BdC2	Badin channery silty clay loam, 8 to 15 percent slopes, eroded	6,417	1.6
BuB	Badin-Urban land complex, 2 to 8 percent slopes	7,950	1.9
BuC	Badin-Urban land complex, 8 to 15 percent slopes	307	0.1
CeB2	Cecil gravelly sandy clay loam, 2 to 8 percent slopes, eroded	13,686	3.3
CeC2	Cecil gravelly sandy clay loam, 8 to 15 percent slopes, eroded	4,655	1.1
ChA	Chewacla silt loam, 0 to 2 percent slopes, frequently flooded	20,914	5.1
CmB	Cid channery silt loam, 1 to 5 percent slopes	70,019	17.2
CnB	Cid-Urban land complex, 1 to 5 percent slopes	1,329	0.3
CoA	Colfax sandy loam, 0 to 3 percent slopes	564	0.1
CrB	Creedmoor loam, 2 to 8 percent slopes	1,328	0.3
GaB2	Gaston clay loam, 2 to 8 percent slopes, eroded	1,608	0.4
GaC2	Gaston clay loam, 8 to 15 percent slopes, eroded	451	0.1
GeB	Georgeville silt loam, 2 to 8 percent slopes	460	0.1
GfB2	Georgeville silty clay loam, 2 to 8 percent slopes, eroded	5,058	1.2
GoC	Goldston very channery silt loam, 4 to 15 percent slopes	10,290	2.5
GoE	Goldston very channery silt loam, 15 to 45 percent slopes	4,878	1.2
GsB	Goldston-Badin complex, 2 to 8 percent slopes	30,866	7.6
GsC	Goldston-Badin complex, 8 to 15 percent slopes	13,320	3.3
GsE	Goldston-Badin complex, 15 to 45 percent slopes	3,538	0.9
HeB	Helena fine sandy loam, 2 to 8 percent slopes	1,984	0.5
IrA	Iredell loam, 0 to 3 percent slopes	1,689	0.4
MeB2	Mecklenburg sandy clay loam, 2 to 8 percent slopes, eroded	825	0.2
MhA	Misenheimer-Cid complex, 0 to 3 percent slopes	5,461	1.3
PaE2	Pacolet sandy clay loam, 15 to 40 percent slopes, eroded	1,462	0.4
PgC	Pacolet-Gullied land complex, 4 to 15 percent slopes	961	0.2
ScA	Secrest-Cid complex, 0 to 3 percent slopes	9,751	2.4
TaB	Tatum gravelly silt loam, 2 to 8 percent slopes	19,582	4.8
TaC	Tatum gravelly silt loam, 8 to 15 percent slopes	3,149	0.8
TaD	Tatum gravelly silt loam, 15 to 35 percent slopes	595	0.1
TbB2	Tatum gravelly silty clay loam, 2 to 8 percent slopes, eroded	49,168	12.1
TbC2	Tatum gravelly silty clay loam, 8 to 15 percent slopes, eroded	7,014	1.7
TuB	Tatum-Urban land complex, 2 to 8 percent slopes	2,486	0.6
Ud	Udorthents, loamy	657	0.2
WhB	White Store loam, 2 to 8 percent slopes	1,220	0.3
WhC	White Store loam, 8 to 15 percent slopes	408	0.1
ZnB	Zion gravelly loam, 2 to 8 percent slopes	4,154	1.0
ZnC	Zion gravelly loam, 8 to 15 percent slopes	526	0.1
	Water	824	0.2
	Total	409,139	100.0

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Soybeans	Corn	Wheat	Grain sorghum	Corn silage	Grass-legume hay	Fescue pasture
		Bu	Bu	Bu	Bu	Tons	Tons	AUM*
AeB:								
Ailey	IVs	18	45	---	---	---	---	---
Appling	IIe	40	95	60	---	---	4.8	8.0
AgC:								
Ailey	VIs	---	---	---	---	---	---	---
Appling	IVe	25	70	35	---	---	4.2	7.0
ApB Appling	IIe	40	95	60	---	---	4.8	8.0
ApC Appling	IVe	30	70	50	---	---	4.2	7.0
AuB**:								
Appling	IIe	40	95	60	---	---	4.8	8.0
Urban land	VIIIs	---	---	---	---	---	---	---
BaB Badin	IIe	30	85	55	50	10	3.9	---
BaC Badin	IIIe	25	75	40	40	---	3.6	---
BdB2 Badin	IIIe	25	70	35	45	---	3.0	---
BdC2 Badin	IVe	20	60	30	35	---	2.5	---
BuB**:								
Badin	IIIe	---	---	---	---	---	---	---
Urban land	VIIIs	---	---	---	---	---	---	---
BuC**:								
Badin	IVe	---	---	---	---	---	---	---
Urban land	VIIIs	---	---	---	---	---	---	---
CeB2 Cecil	IIIe	50	90	---	50	---	2.4	5.5
CeC2 Cecil	IVe	40	80	---	40	---	1.8	4.5
ChA Chewacla	IVw	30	100	50	---	12	4.0	9.0
CmB Cid	IIe	45	90	50	45	14	4.0	7.0
CnB**:								
Cid	IIe	---	---	---	---	---	4.0	7.0

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Soybeans	Corn	Wheat	Grain sorghum	Corn silage	Grass-legume hay	Fescue pasture
		Bu	Bu	Bu	Bu	Tons	Tons	AUM*
CnB**:								
Urban land	VIIIs	---	---	---	---	---	---	---
CoA Colfax	IIIw	30	75	40	---	15	2.4	6.0
CrB Creedmoor	IIe	---	80	---	50	---	---	6.0
GaB2 Gaston	IIIe	35	90	---	50	22	2.8	8.3
GaC2 Gaston	IVe	25	80	---	40	16	2.2	7.6
GeB Georgeville	IIe	---	95	---	55	18	---	---
GfB2 Georgeville	IIIe	---	80	---	50	16	---	---
GoC Goldston	IVs	15	65	25	35	---	2.8	4.5
GoE Goldston	VIIs	---	---	---	---	---	1.8	3.0
GsB:								
Goldston	IVs	15	65	25	54	---	2.8	4.5
Badin	IIIe	30	85	40	55	---	3.9	---
GsC:								
Goldston	IVs	15	65	25	54	---	2.8	4.5
Badin	IVe	25	75	35	50	---	3.6	---
GsE:								
Goldston	VIIs	---	---	---	---	---	1.8	3.0
Badin	VIIe	---	---	---	---	---	3.0	---
HeB Helena	IIe	---	80	---	50	---	3.5	6.0
IrA Iredell	IIw	---	65	---	---	---	---	---
MeB2 Mecklenburg	IIIe	30	65	---	45	---	2.7	6.0
MhA:								
Misenheimer	IIIw	20	70	30	40	---	3.0	6.0
Cid	IIw	30	90	40	---	16	3.5	8.0
PaE2 Pacolet	VIIe	---	---	---	---	---	---	---
PgC**:								
Pacolet	VIe	---	---	---	---	---	---	---

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Soybeans	Corn	Wheat	Grain sorghum	Corn silage	Grass-legume hay	Fescue pasture
		Bu	Bu	Bu	Bu	Tons	Tons	AUM*
PgC**:								
Gullied land---	VIIIe	---	---	---	---	---	---	---
ScA:								
Secrest--------	IIw	35	105	45	50	19	2.0	7.0
Cid------------	IIw	35	90	40	45	16	3.5	8.0
TaB------------- Tatum	IIe	35	95	55	50	18	3.0	8.0
TaC------------- Tatum	IIIe	30	85	45	40	17	2.5	7.5
TaD------------- Tatum	VIe	---	---	---	---	---	---	4.5
TbB2------------ Tatum	IIIe	25	90	50	45	16	3.0	8.0
TbC2------------ Tatum	IVe	35	80	40	35	15	2.5	7.5
TuB**:								
Tatum----------	IIe	---	95	55	---	---	---	---
Urban land-----	VIIIs	---	---	---	---	---	---	---
Ud-------------- Udorthents	VIIe	---	---	---	---	---	---	---
WhB------------- White Store	IIe	---	80	---	50	---	3.6	6.0
WhC------------- White Store	IIIe	---	60	---	---	---	3.4	5.6
ZnB------------- Zion	IIe	---	60	30	---	12	2.5	5.0
ZnC------------- Zion	IIIe	---	50	25	---	10	2.0	4.5

* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Volume*	Trees to plant
AeB**, AgC**:									
Ailey	8S	Slight	Moderate	Moderate	Slight	Loblolly pine	84	118	Loblolly pine, shortleaf pine.
						Shortleaf pine	---	---	
						Virginia pine	---	---	
						Yellow-poplar	---	---	
						Hickory	---	---	
						White oak	---	---	
						Southern red oak	---	---	
						Post oak	---	---	
Appling	8A	Slight	Slight	Slight	Slight	Loblolly pine	84	118	Loblolly pine, shortleaf pine.
						Shortleaf pine	65	99	
						Virginia pine	74	114	
						White oak	64	47	
						Yellow-poplar	88	86	
						Southern red oak	---	---	
						Hickory	---	---	
						Post oak	---	---	
ApB, ApC Appling	8A	Slight	Slight	Slight	Slight	Loblolly pine	84	118	Loblolly pine, shortleaf pine.
						Shortleaf pine	65	99	
						Virginia pine	74	114	
						White oak	64	47	
						Yellow-poplar	88	86	
						Southern red oak	---	--	
						Hickory	---	--	
BaB, BaC Badin	8D	Slight	Slight	Slight	Moderate	Loblolly pine	80	110	Loblolly pine, shortleaf pine.
						Shortleaf pine	68	106	
						Virginia pine	---	---	
						Yellow-poplar	---	---	
						White oak	63	45	
						Scarlet oak	65	47	
						Chestnut oak	66	48	
						Northern red oak	---	---	
						Hickory	---	---	
						Post oak	---	---	
BdB2, BdC2 Badin	6D	Moderate	Moderate	Moderate	Moderate	Loblolly pine	70	93	Loblolly pine, shortleaf pine.
						Shortleaf pine	60	88	
						White oak	60	43	
						Virginia pine	---	---	
						Post oak	---	---	
						Yellow-poplar	---	---	
CeB2, CeC2 Cecil	7C	Moderate	Moderate	Moderate	Slight	Loblolly pine	73	98	Loblolly pine, shortleaf pine.
						Shortleaf pine	67	103	
						Virginia pine	71	110	
						White oak	79	61	
						Southern red oak	79	61	
						Post oak	---	---	
						Scarlet oak	81	63	
						Yellow-poplar	92	93	
						Hickory	---	---	

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
ChA------------- Chewacla	7W	Slight	Moderate	Slight	Moderate	Yellow-poplar-------	95	98	Yellow-poplar, loblolly pine, sweetgum, American
						Loblolly pine-------	95	142	
						Sweetgum-----------	97	128	
						Water oak-----------	80	74	
						Green ash-----------	---	---	
						Blackgum-----------	---	---	
						Willow oak----------	---	---	
CmB------------- Cid	6W	Slight	Moderate	Slight	Moderate	Shortleaf pine------	60	88	Shortleaf pine, loblolly pine.
						White oak-----------	52	36	
						Virginia pine-------	---	---	
						Loblolly pine-------	82	114	
						Southern red oak----	---	---	
						Blackgum-----------	---	---	
						Willow oak----------	---	---	
						Black oak-----------	---	---	
						Scarlet oak---------	---	---	
						Post oak------------	---	---	
						Red maple-----------	---	---	
						Blackjack oak-------	---	---	
CoA------------- Colfax	8W	Slight	Moderate	Slight	Slight	Loblolly pine-------	80	110	Loblolly pine, Virginia pine.
						Shortleaf pine------	70	110	
						Sweetgum-----------	80	79	
						Yellow-poplar-------	80	71	
CrB------------- Creedmoor	9A	Slight	Slight	Slight	Slight	Loblolly pine-------	87	125	Loblolly pine.
						Virginia pine-------	64	98	
						Shortleaf pine------	---	---	
						Sweetgum-----------	---	---	
						Water oak-----------	---	---	
						Red maple-----------	---	---	
GaB2, GaC2------ Gaston	8C	Slight	Moderate	Moderate	Slight	Loblolly pine-------	85	120	
						Shortleaf pine------	---	---	
						Yellow-poplar-------	---	---	
						White oak-----------	---	---	
						Southern red oak----	---	---	
						Hickory-------------	---	---	
						Virginia pine-------	---	---	
GeB------------- Georgeville	8A	Slight	Slight	Slight	Slight	Loblolly pine-------	81	112	Loblolly pine, Virginia pine, eastern redcedar, black walnut, yellow-poplar.
						Shortleaf pine------	63	95	
						White oak-----------	69	51	
						Scarlet oak---------	70	52	
						Southern red oak----	67	49	
						Yellow-poplar-------	---	---	
						Hickory-------------	---	---	
GfB2------------ Georgeville	7C	Slight	Moderate	Moderate	Slight	Loblolly pine-------	75	101	Loblolly pine, Virginia pine.
						Shortleaf pine------	58	84	
						Yellow-poplar-------	---	---	
						Hickory-------------	---	---	
						White oak-----------	---	---	
						Southern red oak----	---	---	

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
GoC------------- Goldston	7D	Slight	Slight	Moderate	Severe	Loblolly pine-------	76	103	Loblolly pine.
						Shortleaf pine------	60	88	
						Southern red oak----	66	48	
						White oak-----------	69	51	
						Post oak------------	---	---	
						Hickory-------------	---	---	
						Virginia pine-------	---	---	
						Blackjack oak-------	---	---	
GoE------------- Goldston	7D	Moderate	Moderate	Moderate	Severe	Loblolly pine-------	76	103	Loblolly pine.
						Shortleaf pine------	60	88	
						White oak-----------	69	51	
						Post oak------------	---	---	
						Hickory-------------	---	---	
						Virginia pine-------	---	---	
						Blackjack oak-------	---	---	
GsB**, GsC**:									
Goldston-------	7D	Slight	Slight	Moderate	Severe	Loblolly pine-------	76	103	Loblolly pine.
						Shortleaf pine------	68	88	
						Southern red oak----	66	48	
						White oak-----------	69	51	
						Post oak------------	---	---	
						Hickory-------------	---	---	
						Virginia pine-------	---	---	
						Chestnut oak--------	---	---	
Badin----------	8D	Slight	Slight	Slight	Moderate	Loblolly pine-------	80	110	Loblolly pine, shortleaf pine.
						Shortleaf pine------	68	106	
						Virginia pine-------	---	---	
						White oak-----------	63	46	
						Chestnut oak--------	66	48	
						Post oak------------	---	---	
						Hickory-------------	---	---	
GsE**:									
Goldston-------	7D	Moderate	Moderate	Moderate	Severe	Loblolly pine-------	76	103	Loblolly pine.
						Shortleaf pine------	56	80	
						White oak-----------	69	51	
						Post oak------------	---	---	
						Hickory-------------	---	---	
						Virginia pine-------	---	---	
						Chestnut oak--------	---	---	
Badin----------	8R	Moderate	Moderate	Slight	Moderate	Loblolly pine-------	80	110	Loblolly pine, shortleaf pine.
						Shortleaf pine------	68	106	
						Virginia pine-------	---	---	
						Yellow-poplar-------	---	---	
						White oak-----------	63	46	
						Post oak------------	---	---	
						Chestnut oak--------	66	48	
HeB------------- Helena	8A	Slight	Slight	Slight	Slight	Loblolly pine-------	84	118	Loblolly pine, yellow-poplar.
						Shortleaf pine------	66	101	
						White oak-----------	---	---	
						Yellow-poplar-------	---	---	
						Southern red oak----	---	---	
						Hickory-------------	---	---	
						Virginia pine-------	---	---	
						Willow oak----------	---	---	

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
IrA------------- Iredell	6C	Slight	Moderate	Moderate	Slight	Loblolly pine-------	67	88	Loblolly pine, eastern redcedar.
						Shortleaf pine------	58	84	
						Post oak------------	44	29	
						White oak-----------	47	32	
						Eastern redcedar----	---	---	
MeB2------------ Mecklenburg	6C	Slight	Moderate	Moderate	Slight	Shortleaf pine------	59	86	Loblolly pine, Virginia pine.
						Loblolly pine-------	66	86	
						Northern red oak----	---	---	
						Virginia pine-------	---	---	
						Sweetgum------------	---	---	
						White oak-----------	---	---	
						Hickory-------------	---	---	
						Eastern redcedar----	---	---	
MhA**:									
Misenheimer----	6D	Slight	Moderate	Moderate	Severe	Shortleaf pine------	58	84	Shortleaf pine.
						White oak-----------	59	42	
						Willow oak----------	---	---	
						Sweetgum------------	---	---	
						Red maple-----------	---	---	
						Blackgum------------	---	---	
						Hickory-------------	---	---	
						Post oak------------	---	---	
						Blackjack oak-------	---	---	
Cid------------	6W	Slight	Moderate	Slight	Moderate	Shortleaf pine------	60	88	Shortleaf pine, loblolly pine.
						White oak-----------	52	36	
						Virginia pine-------	---	---	
						Loblolly pine-------	82	114	
						Sweetgum------------	---	---	
						Willow oak----------	---	---	
						Blackjack oak-------	---	---	
						Post oak------------	---	---	
						Hickory-------------	---	---	
PaE2------------ Pacolet	6C	Moderate	Moderate	Moderate	Slight	Loblolly pine-------	70	93	Loblolly pine, shortleaf pine, yellow-poplar, eastern white pine.
						Shortleaf pine------	60	88	
						Yellow-poplar-------	80	71	
						Virginia pine-------	---	---	
						Hickory-------------	---	---	
						White oak-----------	---	---	
						Post oak------------	---	---	
PgC**:									
Pacolet--------	6C	Severe	Severe	Severe	Slight	Loblolly pine-------	70	95	Loblolly pine, shortleaf pine, yellow-poplar, eastern white pine.
						Shortleaf pine------	60	88	
						Yellow-poplar-------	80	71	
						Virginia pine-------	---	---	
						Northern red oak----	---	---	
						Hickory-------------	---	---	
						White oak-----------	---	---	
						Post oak------------	---	---	
Gullied land.									

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi- nation symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equip- ment limita- tion	Seedling mortal- ity	Wind- throw hazard	Common trees	Site index	Volume*	
ScA**:									
Secrest	8W	Slight	Moderate	Slight	Slight	Loblolly pine	80	110	Loblolly pine.
						Shortleaf pine	65	99	
						White oak	---	---	
						Willow oak	---	---	
						Post oak	---	---	
						Virginia pine	---	---	
						Yellow-poplar	---	---	
						Southern red oak	---	---	
						Blackjack oak	---	---	
Cid	6W	Slight	Moderate	Slight	Moderate	Shortleaf pine	60	88	Shortleaf pine, loblolly pine.
						White oak	52	36	
						Virginia pine	---	---	
						Loblolly pine	---	---	
						Southern red oak	---	---	
						Willow oak	---	---	
						Blackjack oak	---	---	
						Post oak	---	---	
						Yellow-poplar	---	---	
TaB, TaC Tatum	8A	Slight	Slight	Slight	Slight	Loblolly pine	78	107	Loblolly pine, eastern white pine, yellow-poplar.
						Northern red oak	72	54	
						Virginia pine	68	105	
						Shortleaf pine	---	---	
						Yellow-poplar	---	---	
						Hickory	---	---	
						White oak	---	---	
TaD Tatum	6R	Moderate	Moderate	Moderate	Slight	Loblolly pine	68	90	Loblolly pine.
						White oak	53	36	
						Virginia pine	58	86	
						Shortleaf pine	---	---	
						Yellow-poplar	---	---	
						Hickory	---	---	
						White oak	---	---	
TbB2, TbC2 Tatum	8A	Slight	Slight	Slight	Slight	Loblolly pine	78	107	Loblolly pine, eastern white pine, yellow-poplar.
						Northern red oak	72	54	
						Virginia pine	68	105	
						Shortleaf pine	---	---	
						Yellow-poplar	---	---	
						Hickory	---	---	
						White oak	---	---	
WhB, WhC White Store	7C	Moderate	Moderate	Moderate	Slight	Loblolly pine	81	112	Loblolly pine, Virginia pine, eastern redcedar.
						Virginia pine	65	100	
						Eastern redcedar	---	---	
						White oak	---	---	
						Post oak	---	---	
						Shortleaf pine	---	---	

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
ZnB, ZnC-------- Zion	6A	Slight	Slight	Slight	Slight	Loblolly pine------- Northern red oak---- Shortleaf pine------ Virginia pine------- Eastern redcedar---- White oak----------- Hickory------------- Blackjack oak-------	70 60 60 70 --- --- --- ---	93 43 88 109 --- --- --- ---	Loblolly pine, eastern white pine.

* Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AeB*:					
Ailey	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Moderate: droughty.
Appling	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
AgC*:					
Ailey	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope, droughty.
Appling	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
ApB Appling	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
ApC Appling	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
AuB*:					
Appling	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
Urban land.					
BaB Badin	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, large stones.
BaC Badin	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, large stones, slope.
BdB2 Badin	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, large stones.
BdC2 Badin	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, large stones, slope.
BuB*:					
Badin	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, large stones.
Urban land.					

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
BuC*:					
Badin	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, large stones, slope.
Urban land.					
CeB2 Cecil	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, large stones.
CeC2 Cecil	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, large stones, slope.
ChA Chewacla	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
CmB Cid	Moderate: small stones, wetness, percs slowly.	Moderate: wetness, small stones, percs slowly.	Severe: small stones.	Moderate: wetness.	Moderate: small stones, large stones, wetness.
CnB*:					
Cid	Moderate: small stones, wetness, percs slowly.	Moderate: wetness, small stones, percs slowly.	Severe: small stones.	Moderate: wetness.	Moderate: small stones, large stones, wetness.
Urban land.					
CoA Colfax	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
CrB Creedmoor	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Moderate: wetness.	Moderate: wetness.
GaB2 Gaston	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
GaC2 Gaston	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
GeB, GfB2 Georgeville	Slight	Slight	Moderate: slope.	Severe: erodes easily.	Slight.
GoC Goldston	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: small stones.	Severe: large stones, depth to rock.
GoE Goldston	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones.	Severe: large stones, slope, depth to rock.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
GsB*:					
Goldston	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: small stones.	Severe: large stones, depth to rock.
Badin	Moderate: small stones.	Moderate: small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, large stones.
GsC*:					
Goldston	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: small stones.	Severe: large stones, depth to rock.
Badin	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, large stones, slope.
GsE*:					
Goldston	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones.	Severe: large stones, slope, depth to rock.
Badin	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
HeB Helena	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
IrA Iredell	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
MeB2 Mecklenburg	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
MhA*:					
Misenheimer	Severe: wetness, depth to rock.	Severe: depth to rock.	Severe: small stones, wetness, depth to rock.	Moderate: wetness.	Severe: depth to rock.
Cid	Moderate: small stones, wetness, percs slowly.	Moderate: wetness, small stones, percs slowly.	Severe: small stones.	Moderate: wetness.	Moderate: small stones, large stones, wetness.
PaE2 Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
PgC*:					
Pacolet	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Gullied land.					

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
ScA*:					
Secrest	Moderate: wetness.	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
Cid	Moderate: small stones, wetness, percs slowly.	Moderate: wetness, small stones, percs slowly.	Severe: small stones.	Moderate: wetness.	Moderate: small stones, large stones, wetness.
TaB Tatum	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones.
TaC Tatum	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, slope.
TaD Tatum	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
TbB2 Tatum	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones.
TbC2 Tatum	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, slope.
TuB*:					
Tatum	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones.
Urban land.					
Ud. Udorthents					
WhB White Store	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
WhC White Store	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: slope, wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness, slope.
ZnB Zion	Moderate: small stones, percs slowly.	Moderate: small stones, percs slowly.	Severe: small stones.	Slight	Moderate: small stones, droughty.
ZnC Zion	Moderate: slope, small stones, percs slowly.	Moderate: slope, small stones, percs slowly.	Severe: slope, small stones.	Slight	Moderate: small stones, droughty, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
AeB*:										
Ailey	Poor	Poor	Fair	Poor	Poor	Poor	Very poor.	Fair	Poor	Very poor.
Appling	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
AgC*:										
Ailey	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
Appling	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ApB Appling	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ApC Appling	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
AuB*:										
Appling	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land.										
BaB Badin	Fair	Good	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
BaC Badin	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BdB2 Badin	Fair	Good	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
BdC2 Badin	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BuB*:										
Badin	Fair	Good	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
Urban land.										
BuC*:										
Badin	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Urban land.										
CeB2 Cecil	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CeC2 Cecil	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
ChA: Chewacla	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
CmB: Cid	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Poor.
CnB*:										
Cid	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Poor.
Urban land.										
CoA: Colfax	Fair	Good	Good	Fair	Fair	Fair	Fair	Good	Fair	Fair.
CrB: Creedmoor	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
GaB2: Gaston	Fair	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
GaC2: Gaston	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
GeB: Georgeville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
GfB2: Georgeville	Fair	Fair	Fair	Good	Fair	Very poor.	Very poor.	Fair	Good	Very poor.
GoC: Goldston	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
GoE: Goldston	Very poor.	Very poor.	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
GsB*:										
Goldston	Poor	Poor	Fair	Poor	Poor	Poor	Very poor.	Poor	Poor	Very poor.
Badin	Fair	Good	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
GsC*:										
Goldston	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Badin	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GsE*:										
Goldston	Very poor.	Very poor.	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Badin	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
HeB: Helena	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
IrA: Iredell	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MeB2: Mecklenburg	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
MhA*:										
Misenheimer	Fair	Good	Good	Fair	Fair	Fair	Fair	Good	Good	Fair.
Cid	Fair	Good	Good	Fair	Fair	Fair	Poor	Good	Fair	Poor.
PaE2: Pacolet	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
PgC*:										
Pacolet	Poor	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Gullied land.										
ScA*:										
Secrest	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Cid	Fair	Good	Good	Fair	Fair	Fair	Poor	Good	Fair	Poor.
TaB: Tatum	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
TaC: Tatum	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
TaD: Tatum	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
TbB2: Tatum	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
TbC2: Tatum	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
TuB*:										
Tatum	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land.										
Ud. Udorthents										
WhB: White Store	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
WhC: White Store	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
ZnB: Zion	Fair	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
ZnC: Zion	Fair	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AeB*:						
Ailey	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
Appling	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
AgC*:						
Ailey	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope, droughty.
Appling	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
ApB Appling	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
ApC Appling	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
AuB*:						
Appling	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
Urban land.						
BaB Badin	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: small stones, large stones.
BaC Badin	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: small stones, large stones, slope.
BdB2 Badin	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: small stones, large stones.
BdC2 Badin	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: small stones, large stones, slope.
BuB*:						
Badin	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: small stones, large stones.
Urban land.						

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
BuC*:						
Badin	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: small stones, large stones, slope.
Urban land.						
CeB2 Cecil	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Moderate: small stones, large stones.
CeC2 Cecil	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: small stones, large stones, slope.
ChA Chewacla	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
CmB Cid	Severe: depth to rock, wetness.	Moderate: wetness, shrink-swell, depth to rock.	Severe: wetness, depth to rock.	Moderate: wetness, shrink-swell.	Severe: low strength.	Moderate: small stones, large stones, wetness.
CnB*:						
Cid	Severe: depth to rock, wetness.	Moderate: wetness, shrink-swell, depth to rock.	Severe: wetness, depth to rock.	Moderate: wetness, shrink-swell.	Severe: low strength.	Moderate: small stones, large stones, wetness.
Urban land.						
CoA Colfax	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
CrB Creedmoor	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Moderate: wetness.
GaB2 Gaston	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
GaC2 Gaston	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
GeB, GfB2 Georgeville	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
GoC Goldston	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, large stones.	Severe: large stones, depth to rock.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
GoE--------------- Goldston	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope, depth to rock.
GsB*:						
Goldston----------	Severe: depth to rock.	Moderate: depth to rock, large stones.	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Moderate: depth to rock, large stones.	Severe: large stones, depth to rock.
Badin-------------	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: small stones, large stones.
GsC*:						
Goldston----------	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, large stones.	Severe: large stones, depth to rock.
Badin-------------	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: small stones, large stones, slope.
GsE*:						
Goldston----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope, depth to rock.
Badin-------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
HeB--------------- Helena	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Moderate: wetness.
IrA--------------- Iredell	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength.	Moderate: wetness.
MeB2-------------- Mecklenburg	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
MhA*:						
Misenheimer-------	Severe: wetness, depth to rock.	Severe: wetness.	Severe: wetness, depth to rock.	Severe: wetness.	Moderate: wetness, depth to rock.	Severe: depth to rock.
Cid---------------	Severe: depth to rock, wetness.	Moderate: wetness, shrink-swell, depth to rock.	Severe: wetness, depth to rock.	Moderate: wetness, shrink-swell.	Severe: low strength.	Moderate: small stones, large stones, wetness.
PaE2-------------- Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
PgC*:						
Pacolet	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
Gullied land.						
ScA*:						
Secrest	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: low strength.	Moderate: wetness.
Cid	Severe: depth to rock, wetness.	Moderate: wetness, shrink-swell, depth to rock.	Severe: wetness, depth to rock.	Moderate: wetness, shrink-swell.	Severe: low strength.	Moderate: small stones, large stones, wetness.
TaB Tatum	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: small stones.
TaC Tatum	Moderate: slope, too clayey.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: small stones, slope.
TaD Tatum	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
TbB2 Tatum	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: small stones.
TbC2 Tatum	Moderate: slope, too clayey.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: small stones, slope.
TuB*:						
Tatum	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: small stones.
Urban land.						
Ud. Udorthents						
WhB White Store	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength.	Moderate: wetness.
WhC White Store	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: wetness, slope.
ZnB Zion	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: small stones, droughty.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
ZnC---------------- Zion	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: slope, shrink-swell.	Severe: low strength, shrink-swell.	Moderate: small stones, droughty, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AeB*:					
Ailey	Severe: percs slowly.	Severe: seepage.	Slight	Severe: seepage.	Good.
Appling	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
AgC*:					
Ailey	Severe: percs slowly.	Severe: seepage, slope.	Moderate: slope.	Severe: seepage.	Fair: slope.
Appling	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
ApB Appling	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
ApC Appling	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
AuB*:					
Appling	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
Urban land.					
BaB Badin	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
BaC Badin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
BdB2 Badin	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
BdC2 Badin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
BuB*:					
Badin	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Urban land.					
BuC*:					
Badin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Urban land.					
CeB2 Cecil	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
CeC2 Cecil	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
ChA Chewacla	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.
CmB Cid	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
CnB*:					
Cid	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Urban land.					
CoA Colfax	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
CrB Creedmoor	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
GaB2 Gaston	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
GaC2 Gaston	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
GeB, GfB2 Georgeville	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
GoC----------------- Goldston	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock.	Poor: depth to rock, small stones.
GoE----------------- Goldston	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
GsB*:					
Goldston------------	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock.	Poor: depth to rock, small stones.
Badin---------------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
GsC*:					
Goldston------------	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock.	Poor: depth to rock, small stones.
Badin---------------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
GsE*:					
Goldston------------	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
Badin---------------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
HeB----------------- Helena	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
IrA----------------- Iredell	Severe: wetness, percs slowly.	Slight-----------	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
MeB2---------------- Mecklenburg	Severe: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight-----------	Poor: too clayey, hard to pack.
MhA*:					
Misenheimer---------	Severe: depth to rock, wetness.	Severe: seepage, depth to rock, wetness.	Severe: depth to rock, seepage, wetness.	Severe: depth to rock, wetness.	Poor: depth to rock, small stones, wetness.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MhA*:					
Cid	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
PaE2 Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
PgC*:					
Pacolet	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: too clayey, slope.
Gullied land.					
ScA*:					
Secrest	Severe: wetness, percs slowly.	Moderate: depth to rock.	Severe: depth to rock, wetness.	Moderate: depth to rock, wetness.	Fair: depth to rock, too clayey, small stones.
Cid	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
TaB Tatum	Moderate: depth to rock, percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: too clayey, depth to rock.	Moderate: depth to rock.	Poor: too clayey, hard to pack, small stones.
TaC Tatum	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: too clayey, depth to rock.	Moderate: slope, depth to rock.	Poor: too clayey, hard to pack, small stones.
TaD Tatum	Severe: slope.	Severe: slope.	Severe: slope, too clayey, depth to rock.	Severe: slope.	Poor: too clayey, hard to pack, small stones.
TbB2 Tatum	Moderate: depth to rock, percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: too clayey, depth to rock.	Moderate: depth to rock.	Poor: too clayey, hard to pack, small stones.
TbC2 Tatum	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: too clayey, depth to rock.	Moderate: slope, depth to rock.	Poor: too clayey, hard to pack, small stones.
TuB*:					
Tatum	Moderate: depth to rock, percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: too clayey, depth to rock.	Moderate: depth to rock.	Poor: too clayey, hard to pack, small stones.
Urban land.					

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ud. Udorthents					
WhB----------------- White Store	Severe: wetness, percs slowly.	Moderate: depth to rock, slope.	Severe: depth to rock, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
WhC----------------- White Store	Severe: wetness, percs slowly.	Severe: slope.	Severe: depth to rock, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
ZnB----------------- Zion	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
ZnC----------------- Zion	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AeB*:				
Ailey	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
Appling	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
AgC*:				
Ailey	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, too sandy.
Appling	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
ApB, ApC Appling	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
AuB*:				
Appling	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Urban land.				
BaB, BaC, BdB2, BdC2 Badin	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
BuB*, BuC*:				
Badin	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
Urban land.				
CeB2, CeC2 Cecil	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
ChA Chewacla	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
CmB Cid	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
CnB*:				
Cid	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
Urban land.				
CoA Colfax	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
CrB------------------- Creedmoor	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
GaB2, GaC2------------ Gaston	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
GeB, GfB2------------- Georgeville	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
GoC------------------- Goldston	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
GoE------------------- Goldston	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
GsB*, GsC*:				
Goldston-------------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
Badin----------------	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
GsE*:				
Goldston-------------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Badin----------------	Poor: depth to rock, slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
HeB------------------- Helena	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
IrA------------------- Iredell	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
MeB2------------------ Mecklenburg	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
MhA*:				
Misenheimer----------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, depth to rock.
Cid------------------	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
PaE2: Pacolet	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
PgC*:				
Pacolet	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Gullied land.				
ScA*:				
Secrest	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Cid	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
TaB, TaC: Tatum	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, too clayey, area reclaim.
TaD: Tatum	Poor: slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, too clayey, area reclaim.
TbB2, TbC2: Tatum	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, too clayey, area reclaim.
TuB*:				
Tatum	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, too clayey, area reclaim.
Urban land.				
Ud. Udorthents				
WhB, WhC: White Store	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
ZnB, ZnC: Zion	Poor: low strength, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
AeB*:						
Ailey	Moderate: seepage, slope.	Slight	Deep to water	Droughty, percs slowly, slope.	Too sandy, percs slowly.	Droughty, rooting depth.
Appling	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope, fast intake.	Soil blowing	Favorable.
AgC*:						
Ailey	Severe: slope.	Slight	Deep to water	Droughty, percs slowly, slope.	Slope, too sandy, percs slowly.	Slope, droughty, rooting depth.
Appling	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, fast intake.	Slope, soil blowing.	Slope.
ApB Appling	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Soil blowing	Favorable.
ApC Appling	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope, soil blowing.	Slope.
AuB*:						
Appling	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Soil blowing	Favorable.
Urban land.						
BaB Badin	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Depth to rock	Depth to rock.
BaC Badin	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
BdB2 Badin	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Depth to rock	Depth to rock.
BdC2 Badin	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
BuB*:						
Badin	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Depth to rock	Depth to rock.
Urban land.						

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
BuC*:						
Badin	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
Urban land.						
CeB2 Cecil	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Favorable	Favorable.
CeC2 Cecil	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
ChA Chewacla	Moderate: seepage.	Severe: piping, hard to pack, wetness.	Flooding	Wetness, flooding.	Wetness	Wetness.
CmB Cid	Moderate: depth to rock, slope.	Severe: hard to pack.	Percs slowly, depth to rock, slope.	Slope, wetness, percs slowly.	Depth to rock, wetness, percs slowly.	Depth to rock, percs slowly.
CnB*:						
Cid	Moderate: depth to rock, slope.	Severe: hard to pack.	Percs slowly, depth to rock, slope.	Slope, wetness, percs slowly.	Depth to rock, wetness, percs slowly.	Depth to rock, percs slowly.
Urban land.						
CoA Colfax	Moderate: seepage.	Severe: thin layer, wetness.	Percs slowly	Wetness, droughty.	Wetness, rooting depth.	Wetness, droughty.
CrB Creedmoor	Moderate: slope.	Severe: hard to pack.	Percs slowly, slope.	Slope, wetness, soil blowing.	Wetness, soil blowing.	Rooting depth, percs slowly.
GaB2 Gaston	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Favorable	Favorable.
GaC2 Gaston	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
GeB, GfB2 Georgeville	Moderate: slope, seepage.	Severe: hard to pack.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
GoC, GoE Goldston	Severe: depth to rock, slope.	Severe: piping, large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
GsB*:						
Goldston	Severe: depth to rock.	Severe: piping, large stones.	Deep to water	Slope, large stones, droughty.	Large stones, depth to rock.	Large stones, droughty.
Badin	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Depth to rock	Depth to rock.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
GsC*, GsE*:						
Goldston	Severe: depth to rock, slope.	Severe: piping, large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Badin	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
HeB: Helena	Moderate: slope.	Severe: hard to pack.	Percs slowly, slope.	Slope, wetness, percs slowly.	Wetness, percs slowly.	Percs slowly.
IrA: Iredell	Slight	Severe: hard to pack.	Percs slowly	Wetness	Wetness	Wetness, percs slowly.
MeB2: Mecklenburg	Moderate: slope, seepage.	Severe: hard to pack.	Deep to water	Percs slowly, slope.	Percs slowly	Percs slowly.
MhA*:						
Misenheimer	Severe: depth to rock.	Severe: thin layer, piping.	Depth to rock	Wetness, depth to rock.	Depth to rock, wetness.	Wetness, depth to rock.
Cid	Moderate: depth to rock.	Severe: hard to pack.	Percs slowly, depth to rock.	Wetness, percs slowly.	Depth to rock, wetness, percs slowly.	Depth to rock, percs slowly.
PaE2: Pacolet	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
PgC*:						
Pacolet	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
Gullied land.						
ScA*:						
Secrest	Moderate: depth to rock.	Moderate: thin layer, piping, wetness.	Favorable	Wetness, percs slowly.	Erodes easily, wetness.	Erodes easily.
Cid	Moderate: depth to rock.	Severe: hard to pack.	Percs slowly, depth to rock.	Wetness, percs slowly.	Depth to rock, wetness, percs slowly.	Depth to rock, percs slowly.
TaB: Tatum	Moderate: seepage, depth to rock, slope.	Severe: piping, hard to pack.	Deep to water	Slope	Favorable	Favorable.
TaC, TaD: Tatum	Severe: slope.	Severe: piping, hard to pack.	Deep to water	Slope	Slope	Slope.
TbB2: Tatum	Moderate: seepage, depth to rock, slope.	Severe: piping, hard to pack.	Deep to water	Slope	Favorable	Favorable.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
TbC2: Tatum	Severe: slope.	Severe: piping, hard to pack.	Deep to water	Slope	Slope	Slope.
TuB*:						
Tatum	Moderate: seepage, depth to rock, slope.	Severe: piping, hard to pack.	Deep to water	Slope	Favorable	Favorable.
Urban land.						
Ud. Udorthents						
WhB: White Store	Moderate: depth to rock, slope.	Severe: hard to pack.	Percs slowly, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
WhC: White Store	Severe: slope.	Severe: hard to pack.	Percs slowly, slope.	Slope, wetness, percs slowly.	Slope, erodes easily, wetness.	Wetness, slope, erodes easily.
ZnB: Zion	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, droughty, percs slowly.	Depth to rock	Droughty, depth to rock.
ZnC: Zion	Severe: slope.	Severe: thin layer.	Deep to water	Slope, droughty, percs slowly.	Slope, depth to rock.	Slope, droughty, depth to rock.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
AeB*, AgC*:											
Ailey	0-25	Loamy sand	SM, SP-SM	A-2, A-3	0	85-100	75-100	50-80	5-20	---	NP
	25-48	Sandy loam, sandy clay loam.	SM, SC, SC-SM	A-2, A-4, A-6	0	90-100	75-100	60-90	30-40	20-40	3-16
	48-58	Sandy loam, sandy clay loam.	SM, SC, SC-SM	A-2, A-4, A-6	0	90-100	75-100	55-90	20-40	20-40	3-15
	58-76	Coarse sandy loam, sandy loam, sandy clay loam.	SM, SC, SC-SM	A-2, A-4, A-6	0	85-100	75-100	50-85	15-40	<40	NP-14
Appling	0-14	Loamy sand	SM, SC-SM	A-2	0-5	86-100	80-100	55-91	15-35	<35	NP-7
	14-46	Sandy clay, clay loam, clay.	MH, ML, CL	A-7	0-5	95-100	90-100	70-95	51-80	41-74	15-30
	46-52	Sandy clay, clay loam, sandy clay loam.	SC, CL	A-4, A-6, A-7	0-5	95-100	85-100	70-90	40-75	25-45	8-22
	52-60	Variable	---	---	---	---	---	---	---	---	---
ApB, ApC Appling	0-9	Sandy loam	SM, SC-SM	A-2	0-5	86-100	80-100	55-91	15-35	<35	NP-7
	9-48	Sandy clay, clay loam, clay.	MH, ML, CL	A-7	0-5	95-100	90-100	70-95	51-80	41-74	15-30
	48-53	Sandy clay, clay loam, sandy clay loam.	SC, CL	A-4, A-6, A-7	0-5	95-100	85-100	70-90	40-75	25-45	8-22
	53-66	Variable	---	---	---	---	---	---	---	---	---
AuB*:											
Appling	0-9	Sandy loam	SM, SC-SM	A-2	0-5	86-100	80-100	55-91	15-35	<35	NP-7
	9-48	Sandy clay, clay loam, clay.	MH, ML, CL	A-7	0-5	95-100	90-100	70-95	51-80	41-74	15-30
	48-53	Sandy clay, clay loam, sandy clay loam.	SC, CL	A-4, A-6, A-7	0-5	95-100	85-100	70-90	40-75	25-45	8-22
	53-66	Variable	---	---	---	---	---	---	---	---	---
Urban land.											
BaB, BaC Badin	0-7	Channery silt loam.	ML, SM, SC-SM, GM	A-4, A-6, A-2-4	0-10	60-100	50-85	45-85	30-80	25-50	4-20
	7-28	Silty clay, silty clay loam, channery silty clay loam.	CL, CH, ML	A-6, A-7	0-5	65-100	60-100	55-100	50-98	30-65	15-35
	28-41	Weathered bedrock	---	---	---	---	---	---	---	---	---
	41	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
BdB2, BdC2 Badin	0-6	Channery silty clay loam.	CL, ML	A-6, A-7	0-10	65-100	60-80	55-75	50-70	30-49	11-20
	6-29	Silty clay, silty clay loam, channery silty clay loam.	CL, CH, ML	A-6, A-7	0-5	65-100	60-100	55-100	50-98	30-65	15-35
	29-41	Weathered bedrock	---	---	---	---	---	---	---	---	---
	41	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
BuB*, BuC*:											
Badin-----------	0-6	Channery silty clay loam.	CL, ML	A-6, A-7	0-10	65-100	60-80	55-75	50-70	30-49	11-20
	6-29	Silty clay, silty clay loam, channery silty clay loam.	CL, CH, ML	A-6, A-7	0-5	65-100	60-100	55-100	50-98	30-65	15-35
	29-41	Weathered bedrock	---	---	---	---	---	---	---	---	---
	41	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Urban land.											
CeB2, CeC2------- Cecil	0-6	Gravelly sandy clay loam.	SM, SC, SC-SM	A-2, A-4, A-6	0-10	65-95	60-85	50-85	25-50	20-40	5-15
	6-54	Clay, clay loam	MH, ML	A-7	0-5	95-100	90-100	70-95	55-90	40-80	10-35
	54-72	Variable---------	---	---	---	---	---	---	---	---	---
ChA-------------- Chewacla	0-7	Silt loam--------	ML, CL, CL-ML	A-4, A-6, A-7	0	98-100	95-100	70-100	55-90	25-49	4-20
	7-18	Silt loam, silty clay loam, clay loam.	ML, CL	A-4, A-6, A-7	0	96-100	95-100	80-100	51-98	30-49	4-22
	18-31	Sandy clay loam, loam, sandy loam.	SM, SC-SM, ML, CL	A-4, A-7-6, A-6	0	96-100	95-100	60-100	36-70	20-45	2-15
	31-52	Loam, clay loam, silty clay loam.	ML, MH, CL, CH	A-4, A-6, A-7	0	85-100	75-100	60-100	51-98	22-61	4-28
	52-72	Variable---------	---	---	---	---	---	---	---	---	---
CmB-------------- Cid	0-9	Channery silt loam.	SM, ML, GM	A-4	0-10	70-95	50-80	40-75	35-65	<35	NP-10
	9-22	Silty clay loam, silty clay, clay.	ML, MH, CL, CH	A-7	0-5	90-100	80-100	75-100	60-98	45-70	15-36
	22-27	Channery silty clay, channery silty clay loam, silty clay.	ML, MH	A-7	0-10	65-100	60-100	55-95	50-85	45-70	15-36
	27-32	Weathered bedrock	---	---	---	---	---	---	---	---	---
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CnB*:											
Cid--------------	0-9	Channery silt loam.	SM, ML, GM	A-4	0-10	70-95	50-80	40-75	35-65	<35	NP-10
	9-22	Silty clay loam, silty clay, clay.	ML, MH, CL, CH	A-7	0-5	90-100	80-100	75-100	60-98	45-70	15-36
	22-27	Channery silty clay, channery silty clay loam, silty clay.	ML, MH	A-7	0-10	65-100	60-100	55-95	50-85	45-70	15-36
	27-32	Weathered bedrock	---	---	---	---	---	---	---	---	---
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Urban land.											

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
CoA-------------- Colfax	0-14	Sandy loam-------	SM, SC-SM, SC	A-2, A-4	0	90-100	90-100	55-70	25-45	10-25	NP-10
	14-29	Sandy clay loam, clay loam, loam.	SC, CL	A-4, A-6, A-7-6	0	90-100	85-100	75-90	40-80	25-45	7-25
	29-48	Sandy loam, fine sandy loam, clay loam.	ML, CL, SM, SC	A-2, A-4, A-6	0	95-100	90-100	60-90	30-70	20-40	NP-20
	48-59	Sandy loam, sandy clay loam.	SM, SC, SC-SM	A-2, A-4	0-10	90-100	90-100	45-85	25-65	10-35	NP-10
	59-65	Weathered bedrock	---	---	---	---	---	---	---	---	---
	65	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CrB-------------- Creedmoor	0-10	Loam-------------	SM, SC-SM	A-4, A-2	0-3	98-100	95-100	70-90	30-49	<25	NP-7
	10-21	Sandy clay loam, clay loam, silty clay loam.	CL	A-7, A-6	0-3	98-100	95-100	85-95	60-80	35-50	20-30
	21-50	Clay, clay loam, sandy clay.	CH, CL	A-7, A-6	0-3	98-100	95-100	85-97	70-95	51-79	25-49
	50-56	Sandy loam, sandy clay loam, silty clay loam.	ML, CL-ML, SM, SC	A-7, A-6, A-4	0-5	98-100	95-100	85-98	45-90	25-49	4-21
	56-62	Weathered bedrock	---	---	---	---	---	---	---	---	---
	62	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
GaB2, GaC2------- Gaston	0-7	Clay loam--------	CL, SC, SM, ML	A-4, A-6, A-7-6	0-5	90-100	84-100	75-95	36-75	30-50	5-20
	7-52	Clay, clay loam	CL, CH, ML, MH	A-7	0-5	95-100	90-100	80-99	65-90	40-82	12-57
	52-59	Clay loam, sandy clay loam, loam.	CL, SC	A-4, A-6, A-7	0-5	90-100	84-100	75-98	36-75	25-50	7-23
	59-96	Variable---------	---	---	---	---	---	---	---	---	---
GeB-------------- Georgeville	0-7	Silt loam--------	CL, ML	A-6, A-7, A-4	0-2	85-100	80-100	75-95	50-98	24-49	3-20
	7-54	Clay, silty clay, silty clay loam.	MH, ML	A-7	0-1	95-100	95-100	90-100	75-98	41-85	15-45
	54-84	Silty clay loam, loam, silt loam.	ML, CL, CL-ML	A-4, A-6	0-5	90-100	90-100	65-100	51-95	<30	NP-12
GfB2------------- Georgeville	0-7	Silty clay loam	CL, ML	A-6, A-7, A-4	0-2	85-100	80-100	75-95	50-98	24-49	3-20
	7-50	Clay, silty clay, silty clay loam.	MH, ML	A-7	0-1	95-100	95-100	90-100	75-98	41-85	15-45
	50-84	Silty clay loam, loam, silt loam.	ML, CL, CL-ML	A-4, A-6	0-5	90-100	90-100	65-100	51-95	<30	NP-12
GoC, GoE--------- Goldston	0-5	Very channery silt loam.	GM, SM, ML	A-2-4, A-4, A-1-b	20-50	40-80	30-80	25-80	20-60	20-40	NP-10
	5-16	Very channery silt loam, very channery very fine sandy loam.	GM, SM, ML	A-2-4, A-4, A-1-b	20-50	40-80	30-80	25-80	20-60	20-40	NP-10
	16-27	Weathered bedrock	---	---	---	---	---	---	---	---	---
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
GsB*, GsC*, GsE*:											
Goldston--------	0-5	Very channery silt loam.	GM, SM, ML	A-2-4, A-4, A-1-b	20-50	40-80	30-80	25-80	20-60	20-40	NP-10
	5-16	Very channery silt loam, very channery very fine sandy loam.	GM, SM, ML	A-2-4, A-4, A-1-b	20-50	40-80	30-80	25-80	20-60	20-40	NP-10
	16-27	Weathered bedrock	---	---	---	---	---	---	---	---	---
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Badin-----------	0-7	Channery silt loam.	ML, SM, SC-SM, GM	A-4, A-6, A-2-4	0-10	60-100	50-85	45-85	30-80	25-50	4-20
	7-28	Silty clay, silty clay loam, channery silty clay loam.	CL, CH, ML	A-6, A-7	0-5	65-100	60-100	55-100	50-98	30-65	15-35
	28-41	Weathered bedrock	---	---	---	---	---	---	---	---	---
	41	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
HeB-------------- Helena	0-8	Fine sandy loam	SM, SC-SM, SC, ML	A-2, A-4	0-5	90-100	90-100	51-95	26-75	<35	NP-10
	8-45	Clay loam, sandy clay, clay.	CH	A-7	0-5	95-100	95-100	73-97	56-86	50-85	24-50
	45-72	Variable---------	---	---	---	---	---	---	---	---	---
IrA-------------- Iredell	0-8	Loam-------------	ML, CL-ML, CL	A-4, A-6	0-1	99-100	95-100	80-95	51-70	25-38	5-12
	8-25	Clay-------------	CH	A-7	0	99-100	60-100	60-100	55-95	54-115	29-85
	25-34	Clay, sandy clay loam, clay loam.	CL, CH, SC	A-7	0-1	98-100	85-100	70-95	40-75	41-60	20-39
	34-60	Variable---------	---	---	---	---	---	---	---	---	---
MeB2------------- Mecklenburg	0-6	Sandy clay loam	CL	A-6, A-7-6	0-5	90-100	90-100	80-100	50-80	25-49	11-25
	6-34	Clay-------------	CH, MH	A-7	0-5	90-100	85-100	80-100	75-95	51-75	20-43
	34-40	Loam, sandy clay loam, clay loam.	CL	A-4, A-6, A-7	0-5	90-100	85-100	80-100	50-80	25-49	8-25
	40-60	Variable---------	---	---	---	---	---	---	---	---	---
MhA*:											
Misenheimer-----	0-6	Channery silt loam.	GM, SM, ML	A-4, A-2-4	0-15	65-90	55-80	30-80	25-75	20-40	NP-10
	6-18	Channery silt loam, channery loam, channery silty clay loam.	GM, SM, ML	A-4, A-2-4, A-6, A-7	0-15	65-90	55-80	30-80	25-75	20-45	NP-15
	18-24	Weathered bedrock	---	---	---	---	---	---	---	---	---
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
MhA*:											
Cid	0-9	Channery silt loam.	SM, ML, GM	A-4	0-10	70-95	50-80	40-75	35-65	<35	NP-10
	9-22	Silty clay loam, silty clay, clay.	ML, MH, CL, CH	A-7	0-5	90-100	80-100	75-100	60-98	45-70	15-36
	22-27	Channery silty clay, channery silty clay loam, silty clay.	ML, MH	A-7	0-10	65-100	60-100	55-95	50-85	45-70	15-36
	27-32	Weathered bedrock	---	---	---	---	---	---	---	---	---
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
PaE2 Pacolet	0-5	Sandy clay loam	SC-SM, SC	A-4, A-6	0-1	95-100	90-100	65-85	36-50	20-40	4-17
	5-26	Sandy clay, clay loam, clay.	ML, MH, CL	A-6, A-7	0-1	80-100	80-100	60-95	51-75	38-65	11-33
	26-35	Clay loam, sandy clay loam, sandy loam.	CL, CL-ML, SC-SM, SC	A-2, A-4, A-6	0-2	80-100	70-100	60-80	30-60	20-35	5-15
	35-60	Variable	---	---	---	---	---	---	---	---	---
PgC*:											
Pacolet	0-4	Clay loam	SC-SM, SC	A-4, A-6	0-1	95-100	90-100	65-85	36-50	20-40	4-17
	4-26	Sandy clay, clay loam, clay.	ML, MH, CL	A-6, A-7	0-1	80-100	80-100	60-95	51-75	38-65	11-33
	26-38	Clay loam, sandy clay loam, sandy loam.	CL, CL-ML, SC-SM, SC	A-2, A-4, A-6	0-2	80-100	70-100	60-80	30-60	20-35	5-15
	38-60	Variable	---	---	---	---	---	---	---	---	---
Gullied land.											
ScA*:											
Secrest	0-11	Silt loam	ML, CL-ML, CL	A-4	0-5	95-100	90-100	85-100	60-90	25-35	NP-10
	11-43	Silt loam, silty clay loam, clay loam.	CL, ML	A-6, A-7, A-4, A-5	0-10	85-100	80-100	70-100	50-95	15-50	15-25
	43-54	Silty clay loam, silty clay, clay.	CL, CH, MH	A-7	0-10	85-100	80-100	75-100	70-95	40-70	15-30
	54-62	Weathered bedrock	---	---	---	---	---	---	---	---	---
	62	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Cid	0-9	Channery silt loam.	SM, ML, GM	A-4	0-10	70-95	50-80	40-75	35-65	<35	NP-10
	9-22	Silty clay loam, silty clay, clay.	ML, MH, CL, CH	A-7	0-5	90-100	80-100	75-100	60-98	45-70	15-36
	22-27	Channery silty clay, channery silty clay loam, silty clay.	ML, MH	A-7	0-10	65-100	60-100	55-95	50-85	45-70	15-36
	27-32	Weathered bedrock	---	---	---	---	---	---	---	---	---
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
TaB, TaC, TaD----Tatum	0-7	Gravelly silt loam.	GM, ML, SM	A-4	0-10	60-80	55-75	45-75	40-70	18-32	NP-10
	7-42	Silty clay loam, silty clay, gravelly clay.	MH, GM, SM, GC	A-7	0-10	60-100	55-95	50-95	45-90	50-80	20-45
	42-53	Variable----------	---	---	---	---	---	---	---	---	---
	53-62	Weathered bedrock	---	---	---	---	---	---	---	---	---
	62	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
TbB2, TbC2-------Tatum	0-6	Gravelly silty clay loam.	CL, GC, SC, CH	A-7	0-10	60-80	55-75	45-75	40-70	41-65	20-40
	6-45	Silty clay loam, silty clay, gravelly clay.	MH, GM, SM, GC	A-7	0-10	60-100	55-95	50-95	45-90	50-80	20-45
	45-54	Variable----------	---	---	---	---	---	---	---	---	---
	54-61	Weathered bedrock	---	---	---	---	---	---	---	---	---
	61	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
TuB*:											
Tatum-----------	0-6	Gravelly silty clay loam.	CL, GC, SC, CH	A-7	0-10	60-80	55-75	45-75	40-70	41-65	20-40
	6-45	Silty clay loam, silty clay, gravelly clay.	MH, GM, SM, GC	A-7	0-10	60-100	55-95	50-95	45-90	50-80	20-45
	45-54	Variable----------	---	---	---	---	---	---	---	---	---
	54-61	Weathered bedrock	---	---	---	---	---	---	---	---	---
	61	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Urban land.											
Ud. Udorthents											
WhB, WhC---------White Store	0-6	Loam-------------	ML, CL-ML	A-4	0-3	90-100	80-100	75-96	51-80	<25	NP-7
	6-50	Clay, silty clay	CH	A-7	0-3	95-100	90-100	85-99	80-98	70-92	45-65
	50-62	Weathered bedrock	---	---	---	---	---	---	---	---	---
ZnB, ZnC---------Zion	0-8	Gravelly loam----	ML, SM, CL, CL-ML	A-4	0	80-100	50-75	40-70	35-65	20-34	2-10
	8-26	Clay, gravelly clay loam.	CH, CL	A-7	0-15	75-100	75-100	50-100	50-95	41-80	20-50
	26-30	Gravelly clay loam, clay loam, clay.	CH, SC, GC	A-7	0-20	55-95	45-95	40-90	36-85	50-70	30-40
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
AeB*, AgC*:										
Ailey-----------	0-25	5-10	1.35-1.45	6.0-20	0.03-0.05	4.5-6.5	Low----------	0.15	4	<1
	25-48	15-35	1.55-1.70	0.6-2.0	0.09-0.12	4.5-5.5	Low----------	0.24		
	48-58	18-32	1.70-1.80	0.06-0.2	0.06-0.10	4.5-5.5	Low----------	----		
	58-76	15-30	1.80-1.95	0.06-0.2	0.04-0.08	4.5-5.5	Low----------	0.15		
Appling---------	0-14	5-10	1.40-1.65	2.0-6.0	0.10-0.15	4.5-6.5	Low----------	0.24	4	.5-2
	14-46	35-60	1.25-1.45	0.6-2.0	0.15-0.17	4.5-5.5	Low----------	0.28		
	46-52	20-50	1.25-1.45	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.28		
	52-60	---	---	---	---	---	-------------	----		
ApB, ApC--------- Appling	0-9	5-20	1.40-1.65	2.0-6.0	0.10-0.15	4.5-6.5	Low----------	0.24	4	.5-2
	9-48	35-60	1.25-1.45	0.6-2.0	0.15-0.17	4.5-5.5	Low----------	0.28		
	48-53	20-50	1.25-1.45	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.28		
	53-66	---	---	---	---	---	-------------	----		
AuB*:										
Appling---------	0-9	5-20	1.40-1.65	2.0-6.0	0.10-0.15	4.5-6.5	Low----------	0.24	4	.5-2
	9-48	35-60	1.25-1.45	0.6-2.0	0.15-0.17	4.5-5.5	Low----------	0.28		
	48-53	20-50	1.25-1.45	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.28		
	53-66	---	---	---	---	---	-------------	----		
Urban land.										
BaB, BaC--------- Badin	0-7	12-27	1.40-1.60	0.6-2.0	0.14-0.20	3.6-6.5	Low----------	0.15	2	1-3
	7-28	35-55	1.30-1.50	0.6-2.0	0.14-0.19	3.6-5.5	Moderate-----	0.24		
	28-41	---	---	---	---	---	-------------	----		
	41	---	---	---	---	---	-------------	----		
BdB2, BdC2------- Badin	0-6	27-40	1.30-1.50	0.6-2.0	0.14-0.19	3.6-6.5	Low----------	0.24	2	.5-2
	6-29	35-55	1.30-1.50	0.6-2.0	0.14-0.19	3.6-5.5	Moderate-----	0.24		
	29-41	---	---	---	---	---	-------------	----		
	41	---	---	---	---	---	-------------	----		
BuB*, BuC*:										
Badin-----------	0-6	27-40	1.30-1.50	0.6-2.0	0.14-0.19	3.6-6.5	Low----------	0.24	2	.5-2
	6-29	35-55	1.30-1.50	0.6-2.0	0.14-0.19	3.6-5.5	Moderate-----	0.24		
	29-41	---	---	---	---	---	-------------	----		
	41	---	---	---	---	---	-------------	----		
Urban land.										
CeB2, CeC2------- Cecil	0-6	20-35	1.45-1.65	0.6-2.0	0.12-0.14	4.5-6.0	Low----------	0.24	4	.5-1
	6-54	35-70	1.30-1.50	0.6-2.0	0.13-0.15	4.5-5.5	Low----------	0.28		
	54-72	---	---	---	---	---	Low----------	----		
ChA-------------- Chewacla	0-7	12-27	1.30-1.60	0.6-2.0	0.15-0.24	4.5-6.5	Low----------	0.28	5	1-4
	7-18	18-35	1.30-1.50	0.6-2.0	0.15-0.24	4.5-6.5	Low----------	0.32		
	18-31	12-35	1.30-1.60	0.6-2.0	0.12-0.20	4.5-6.5	Low----------	0.28		
	31-52	12-35	1.30-1.50	0.6-2.0	0.15-0.24	4.5-7.8	Low----------	0.32		
	52-72	---	---	---	---	---	-------------	----		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
CmB-------------- Cid	0-9	12-27	1.35-1.60	0.6-2.0	0.11-0.17	3.6-5.5	Low----------	0.32	2	.5-2
	9-22	35-60	1.25-1.55	0.06-0.2	0.12-0.18	3.6-5.5	Moderate-----	0.28		
	22-27	35-60	1.25-1.55	0.06-0.2	0.12-0.18	3.6-5.5	Moderate-----	0.28		
	27-32	---	---	---	---	---	-------------	----		
	32	---	---	---	---	---	-------------	----		
CnB*:										
Cid-------------	0-9	12-27	1.35-1.60	0.6-2.0	0.11-0.17	3.6-5.5	Low----------	0.32	2	.5-2
	9-22	35-60	1.25-1.55	0.06-0.2	0.12-0.18	3.6-5.5	Moderate-----	0.28		
	22-27	35-60	1.25-1.55	0.06-0.2	0.12-0.18	3.6-5.5	Moderate-----	0.28		
	27-32	---	---	---	---	---	-------------	----		
	32	---	---	---	---	---	-------------	----		
Urban land.										
CoA-------------- Colfax	0-14	5-20	1.20-1.50	0.6-6.0	0.08-0.12	3.5-6.0	Low----------	0.17	3	1-3
	14-29	20-35	1.25-1.55	0.6-2.0	0.13-0.18	3.5-5.5	Moderate-----	0.28		
	29-48	15-30	1.65-1.80	0.06-0.2	0.-0.05	3.5-5.5	Low----------	0.28		
	48-59	10-35	1.30-1.55	0.6-2.0	0.05-0.10	3.5-5.5	Low----------	0.28		
	59-65	---	---	0.0-0.06	---	---	-------------	----		
	65	---	---	---	---	---	-------------	----		
CrB-------------- Creedmoor	0-10	12-27	1.55-1.70	2.0-6.0	0.10-0.14	3.6-6.5	Low----------	0.28	3	.5-2
	10-21	20-35	1.45-1.65	0.2-0.6	0.13-0.15	3.6-5.5	Moderate-----	0.32		
	21-50	35-60	1.30-1.50	<0.06	0.13-0.15	3.6-5.5	High---------	0.32		
	50-56	5-35	1.60-1.95	<0.06	0.10-0.14	3.6-5.5	Low----------	0.37		
	56-62	---	---	---	---	---	-------------	----		
	62	---	---	---	---	---	-------------	----		
GaB2, GaC2------- Gaston	0-7	27-40	1.30-1.60	0.6-2.0	0.12-0.16	5.1-6.5	Low----------	0.28	4	.5-3
	7-52	40-70	1.30-1.60	0.6-2.0	0.12-0.16	4.5-6.5	Moderate-----	0.24		
	52-59	20-45	1.30-1.60	0.6-2.0	0.10-0.15	4.5-6.5	Low----------	0.28		
	59-96	---	---	---	---	---	-------------	----		
GeB-------------- Georgeville	0-7	12-27	1.20-1.40	0.6-2.0	0.13-0.18	4.5-6.0	Low----------	0.49	4	<.5
	7-54	35-65	1.20-1.40	0.6-2.0	0.13-0.18	4.5-5.5	Low----------	0.28		
	54-84	15-40	1.20-1.40	0.6-2.0	0.05-0.10	4.5-5.5	Low----------	0.32		
GfB2------------- Georgeville	0-7	27-35	1.20-1.40	0.6-2.0	0.13-0.18	4.5-6.0	Low----------	0.49	4	<.5
	7-50	35-65	1.20-1.40	0.6-2.0	0.13-0.18	4.5-5.5	Low----------	0.28		
	50-84	15-40	1.20-1.40	0.6-2.0	0.05-0.10	4.5-5.5	Low----------	0.32		
GoC, GoE--------- Goldston	0-5	5-15	1.40-1.60	2.0-6.0	0.06-0.12	3.6-5.5	Low----------	0.05	1	.5-2
	5-16	5-27	1.40-1.60	2.0-6.0	0.06-0.12	3.6-5.5	Low----------	0.05		
	16-27	---	---	---	---	---	-------------	----		
	27	---	---	---	---	---	-------------	----		
GsB*, GsC*, GsE*:										
Goldston---------	0-5	5-15	1.40-1.60	2.0-6.0	0.06-0.12	3.6-6.5	Low----------	0.05	1	.5-2
	5-16	5-27	1.40-1.60	2.0-6.0	0.06-0.12	3.6-5.5	Low----------	0.05		
	16-27	---	---	---	---	---	-------------	----		
	27	---	---	---	---	---	-------------	----		
Badin------------	0-7	10-27	1.40-1.60	0.6-2.0	0.14-0.20	3.6-6.5	Low----------	0.15	2	1-3
	7-28	35-55	1.30-1.50	0.6-2.0	0.14-0.19	3.6-5.5	Moderate-----	0.24		
	28-41	---	---	---	---	---	-------------	----		
	41	---	---	---	---	---	-------------	----		
HeB-------------- Helena	0-8	5-20	1.58-1.62	2.0-6.0	0.10-0.12	3.6-6.0	Low----------	0.24	4	.5-2
	8-45	35-60	1.44-1.55	0.06-0.2	0.13-0.15	3.6-5.5	High---------	0.28		
	45-72	---	---	---	---	---	-------------	----		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
IrA-------------- Iredell	0-8	15-35	1.20-1.40	0.6-2.0	0.14-0.17	5.1-7.3	Low-----------	0.32	3	.5-2
	8-25	40-60	1.20-1.45	0.06-0.2	0.16-0.22	5.6-7.3	Very high----	0.20		
	25-34	20-50	1.30-1.60	0.06-0.2	0.14-0.18	6.1-7.8	High---------	0.28		
	34-60	---	---	---	---	---	-------------	----		
MeB2------------- Mecklenburg	0-6	20-35	1.40-1.60	0.6-2.0	0.12-0.14	5.6-6.5	Low-----------	0.28	2	.5-1
	6-34	40-60	1.40-1.60	0.06-0.2	0.12-0.14	5.6-7.3	Moderate-----	0.28		
	34-40	20-35	1.40-1.60	0.6-2.0	0.12-0.14	5.6-7.3	Low-----------	0.32		
	40-60	---	---	---	---	---	-------------	----		
MhA*:										
Misenheimer-----	0-6	7-27	1.40-1.60	0.6-6.0	0.12-0.18	3.6-6.5	Low-----------	0.15	1	.5-1
	6-18	7-35	1.40-1.60	0.6-6.0	0.12-0.18	3.6-5.5	Low-----------	0.15		
	18-24	---	---	---	---	---	-------------	----		
	24	---	---	---	---	---	-------------	----		
Cid-------------	0-9	10-25	1.35-1.60	0.6-2.0	0.11-0.17	3.6-5.5	Low-----------	0.32	2	.5-2
	9-22	35-60	1.25-1.55	0.06-0.2	0.12-0.18	3.6-5.5	Moderate-----	0.28		
	22-27	35-60	1.25-1.55	0.06-0.2	0.12-0.18	3.6-5.5	Moderate-----	0.28		
	27-32	---	---	---	---	---	-------------	----		
	32	---	---	---	---	---	-------------	----		
PaE2------------- Pacolet	0-5	20-40	1.30-1.50	0.6-2.0	0.10-0.14	4.5-6.5	Low-----------	0.24	2	.5-1
	5-26	35-65	1.30-1.50	0.6-2.0	0.12-0.15	4.5-6.0	Low-----------	0.28		
	26-35	15-30	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low-----------	0.28		
	35-60	12-35	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low-----------	0.28		
PgC*:										
Pacolet---------	0-4	20-40	1.30-1.50	0.6-2.0	0.10-0.14	4.5-6.5	Low-----------	0.24	2	.5-1
	4-26	35-65	1.30-1.50	0.6-2.0	0.12-0.15	4.5-6.0	Low-----------	0.28		
	26-38	15-30	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low-----------	0.28		
	38-60	12-35	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low-----------	0.28		
Gullied land.										
ScA*:										
Secrest---------	0-11	12-27	1.20-1.40	0.6-2.0	0.18-0.22	4.5-6.0	Low-----------	0.37	4	.5-2
	11-43	12-35	1.20-1.45	0.2-0.6	0.12-0.18	4.5-6.0	Low-----------	0.28		
	43-54	27-60	1.25-1.45	0.06-0.2	0.10-0.18	4.5-6.0	Low-----------	0.28		
	54-62	---	---	---	---	---	-------------	----		
	62	---	---	---	---	---	-------------	----		
Cid-------------	0-9	12-27	1.35-1.60	0.6-2.0	0.11-0.17	3.6-5.5	Low-----------	0.32	2	.5-2
	9-22	35-60	1.25-1.55	0.06-0.2	0.12-0.18	3.6-5.5	Moderate-----	0.28		
	22-27	35-60	1.25-1.55	0.06-0.2	0.12-0.18	3.6-5.5	Moderate-----	0.28		
	27-32	---	---	---	---	---	-------------	----		
	32	---	---	---	---	---	-------------	----		
TaB, TaC, TaD---- Tatum	0-7	12-27	1.10-1.40	0.6-2.0	0.10-0.17	4.5-6.5	Low-----------	0.20	4	.5-2
	7-42	45-60	1.40-1.45	0.6-2.0	0.08-0.12	4.5-5.5	Moderate-----	0.28		
	42-53	---	---	0.0-0.06	---	---	-------------	----		
	53-62	---	---	---	---	---	-------------	----		
	62	---	---	---	---	---	-------------	----		
TbB2, TbC2------- Tatum	0-6	40-50	1.20-1.50	0.6-2.0	0.08-0.12	4.5-6.5	Moderate-----	0.15	3	.5-2
	6-45	45-60	1.40-1.45	0.6-2.0	0.08-0.12	4.5-5.5	Moderate-----	0.28		
	45-54	---	---	0.0-0.06	---	---	-------------	----		
	54-61	---	---	---	---	---	-------------	----		
	61	---	---	---	---	---	-------------	----		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
TuB*:										
Tatum-----------	0-6	40-50	1.20-1.50	0.6-2.0	0.08-0.12	4.5-6.5	Moderate-----	0.15	3	.5-2
	6-45	45-60	1.40-1.45	0.6-2.0	0.08-0.12	4.5-5.5	Moderate-----	0.28		
	45-54	---	---	0.0-0.06	---	---	-------------	----		
	54-61	---	---	---	---	---	-------------	----		
	61	---	---	---	---	---	-------------	----		
Urban land.										
Ud. Udorthents										
WhB, WhC--------- White Store	0-6	5-27	1.30-1.55	0.6-2.0	0.14-0.16	5.6-7.3	Low----------	0.43	3	.5-2
	6-50	45-70	1.15-1.35	<0.06	0.15-0.17	4.5-5.5	Very high----	0.37		
	50-62	---	---	---	---	---	-------------	----		
ZnB, ZnC--------- Zion	0-8	7-27	1.20-1.50	0.6-2.0	0.12-0.18	4.5-6.5	Low----------	0.32	2	.5-2
	8-26	35-60	1.20-1.50	0.06-0.6	0.10-0.19	4.5-7.3	High---------	0.28		
	26-30	35-50	1.30-1.60	0.2-2.0	0.07-0.15	5.1-7.3	High---------	0.17		
	30	---	---	0.0-0.01	---	---	-------------	----		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hard-ness	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In			
AeB*, AgC*:											
Ailey	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Appling	B	None	---	---	>6.0	---	---	>72	---	Moderate	Moderate.
ApB, ApC: Appling	B	None	---	---	>6.0	---	---	>72	---	Moderate	Moderate.
AuB*:											
Appling	B	None	---	---	>6.0	---	---	>72	---	Moderate	Moderate.
Urban land.											
BaB, BaC, BdB2, BdC2: Badin	B	None	---	---	>6.0	---	---	20-40 >40	Soft Hard	High	High.
BuB*, BuC*:											
Badin	B	None	---	---	>6.0	---	---	20-40 >40	Soft Hard	High	High.
Urban land.											
CeB2, CeC2: Cecil	B	None	---	---	>6.0	---	---	>60	---	High	High.
ChA: Chewacla	C	Frequent	Brief to long.	Nov-Apr	0.5-1.5	Apparent	Nov-Apr	>60	---	High	Moderate.
CmB: Cid	C	None	---	---	1.5-2.5	Perched	Dec-May	20-40	Hard	High	High.
CnB*:											
Cid	C	None	---	---	1.5-2.5	Perched	Dec-May	20-40	Hard	High	High.
Urban land.											
CoA: Colfax	C	None	---	---	0.5-1.5	Perched	Nov-Jun	40-60 >60	Soft Hard	High	High.
CrB: Creedmoor	C	None	---	---	1.5-2.0	Perched	Jan-Mar	40-60 >60	Soft Hard	High	High.
GaB2, GaC2: Gaston	C	None	---	---	>6.0	---	---	>60	---	High	Moderate.
GeB, GfB2: Georgeville	B	None	---	---	>6.0	---	---	>60	---	High	High.
GoC, GoE: Goldston	C	None	---	---	>6.0	---	---	10-20 20-40	Soft Hard	Moderate	High.
GsB*, GsC*, GsE*:											
Goldston	C	None	---	---	>6.0	---	---	10-20 20-40	Soft Hard	Moderate	High.

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In			
GsB*, GsC*, GsE*:											
Badin	B	None	---	---	>6.0	---	---	20-40	Soft	High	High.
								>40	Hard		
HeB Helena	C	None	---	---	1.5-2.5	Perched	Jan-Apr	>60	---	High	High.
IrA Iredell	C/D	None	---	---	1.0-2.0	Perched	Dec-Apr	>60	---	High	Low.
MeB2 Mecklenburg	C	None	---	---	>6.0	---	---	>60	---	High	Moderate.
MhA*:											
Misenheimer	C	None	---	---	1.0-1.5	Perched	Dec-Apr	10-20	Soft	High	High.
								20-40	Hard		
Cid	C	None	---	---	1.5-2.5	Perched	Dec-May	20-40	Hard	High	High.
PaE2 Pacolet	B	None	---	---	>6.0	---	---	>60	---	High	High.
PgC*:											
Pacolet	B	None	---	---	>6.0	---	---	>60	---	High	High.
Gullied land.											
ScA*:											
Secrest	C	None	---	---	1.5-2.5	Perched	Dec-Mar	40-60	Soft	Moderate	High.
								>60	Hard		
Cid	C	None	---	---	1.5-2.5	Perched	Dec-May	20-40	Hard	High	High.
TaB, TaC, TaD, TbB2, TbC2 Tatum	B	None	---	---	>6.0	---	---	40-60	Soft	High	High.
								>60	Hard		
TuB*:											
Tatum	B	None	---	---	>6.0	---	---	40-60	Soft	High	High.
								>60	Hard		
Urban land.											
Ud. Udorthents											
WhB, WhC White Store	D	None	---	---	1.0-1.5	Perched	Dec-Mar	40-60	Soft	High	High.
								>60	Hard		
ZnB, ZnC Zion	C	None	---	---	>6.0	---	---	20-40	Hard	High	Moderate.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Ailey	Loamy, siliceous, thermic Arenic Kanhapludults
Appling	Clayey, kaolinitic, thermic Typic Kanhapludults
Badin	Clayey, mixed, thermic Typic Hapludults
Cecil	Clayey, kaolinitic, thermic Typic Kanhapludults
Chewacla	Fine-loamy, mixed, thermic Fluvaquentic Dystrochrepts
Cid	Clayey, mixed, thermic Aquic Hapludults
Colfax	Fine-loamy, mixed, thermic Aquic Fragiudults
Creedmoor	Clayey, mixed, thermic Aquic Hapludults
Gaston	Clayey, mixed, thermic Humic Hapludults
Georgeville	Clayey, kaolinitic, thermic Typic Hapludults
Goldston	Loamy-skeletal, siliceous, thermic, shallow Typic Dystrochrepts
Helena	Clayey, mixed, thermic Aquic Hapludults
Iredell	Fine, montmorillonitic, thermic Typic Hapludalfs
Mecklenburg	Fine, mixed, thermic Ultic Hapludalfs
Misenheimer	Loamy, siliceous, thermic, shallow Aquic Dystrochrepts
Pacolet	Clayey, kaolinitic, thermic Typic Kanhapludults
Secrest	Fine-silty, siliceous, thermic Aquic Hapludults
Tatum	Clayey, mixed, thermic Typic Hapludults
Udorthents	Udorthents
White Store	Fine, mixed, thermic Vertic Hapludalfs
Zion	Fine, mixed, thermic Ultic Hapludalfs

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